THE IRON AGE

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▲▲▲ THE IRON AGE ▲▲▲

JUNE 13, 1935

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New Iron Age Feature Fills Long Felt Need

ONE of the most widely held theories of the day is that the depression was caused and prolonged by a lack of consumer buying power. It is contended that private enterprise inevitably creates economic breakdowns because profit taking does not leave workers enough to buy what they produce.

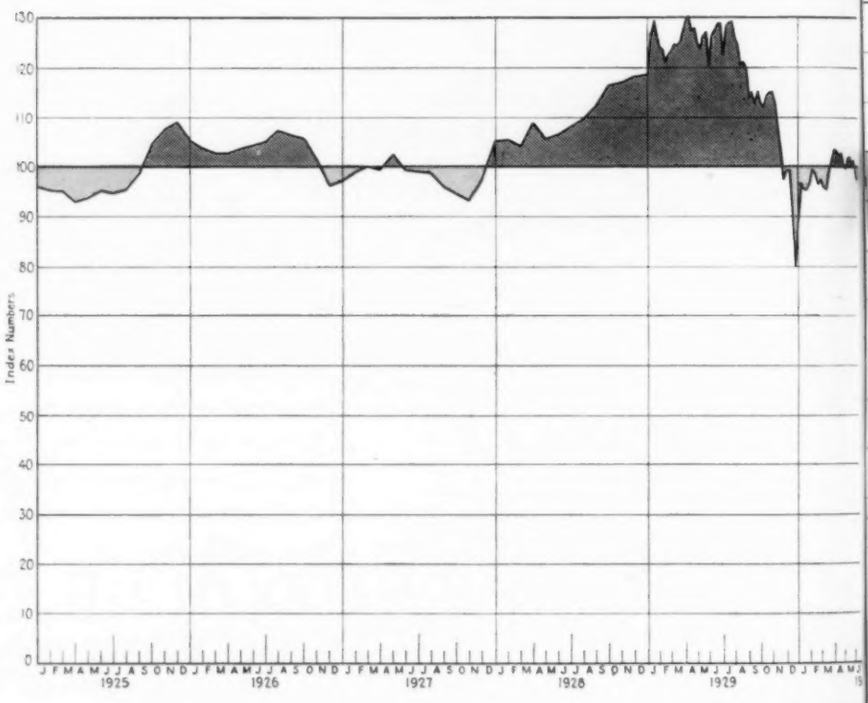
This reasoning is based on the fallacious assumption that the margin above costs remains unspent. As a matter of fact, it is not only spent but creates employment. In the last analysis, management has two payrolls—what it pays its own employees and what it pays indirectly to employees of enterprises from which it buys.

A shrinkage in the indirect payroll accounts for most of the unemployment of the depression. As leading economists have clearly demonstrated, lack of corporate and business buying rather than lack of consumer buying is the primary cause of continued economic distress. When profits reappear and confidence rises, business will again become a large buyer. Expansion of such buying will be the best augury of recovery.

To supply a means of watching the course of this key activity, THE IRON AGE has developed a capital goods index, introduced in this issue. The index is unique in that it is focused on durable goods, with which this journal is chiefly concerned, and has the timeliness of weekly appearance. The index satisfies a long felt want and will be supplemented in later issues by a number of other major weekly indexes also covering the special needs of our readers.

Capital Goods Activity to Be M

WITH this issue, THE IRON AGE presents for the first time a new Weekly Index of Capital Goods Activity which will appear regularly in the future. This index, which has been in the course of preparation for several months, fills a long-felt need for a current and timely measure of the rate of activity in the important branches of American industry represented by readers of THE IRON AGE. These industries, comprising the manufacture and construction of so-called durable or capital goods, have been affected by the depression with exceptional severity, and it is generally recognized that upon their revival depends the full restoration of prosperity in the United States.



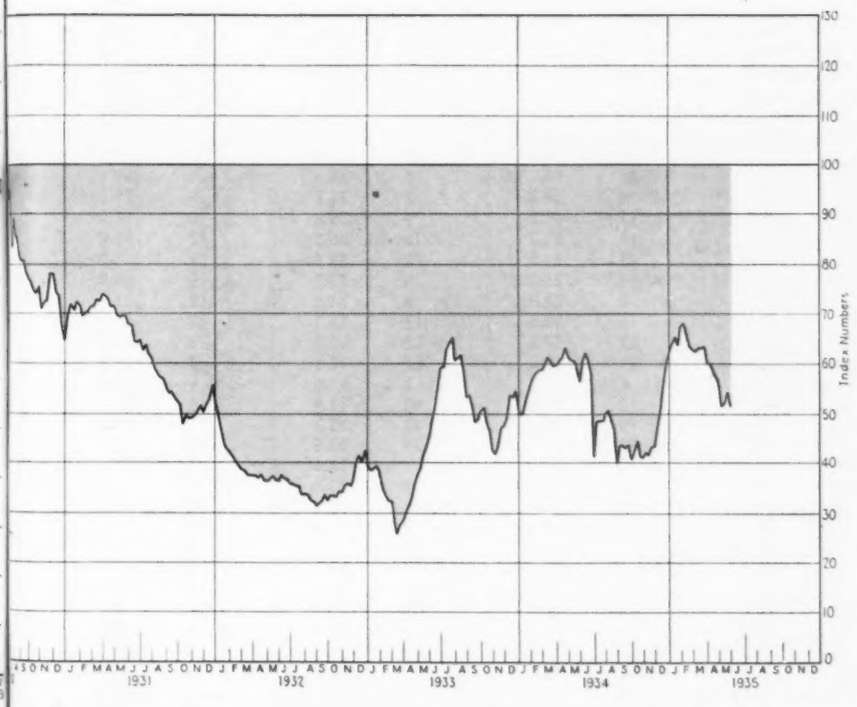
The Iron Age Weekly Index of Capital Goods Activity. Monthly index numbers to date. Average

Trend of Business During Past Decade

The trend of operations in these industries is indicated in the colored chart which shows the fluctuations of THE IRON AGE Index during the past decade. From the relatively stable level maintained during the period from 1925 to 1927 the index advanced steadily for more than a year, reaching a peak 30 per cent above the 1925-27 average in April, 1929. So far as actual operations in the capital goods industries were concerned, there is no evidence in this chart that the boom, if it can be called such, was either excessive or of long duration. Before the end of 1929 the index had fallen below the 100 level, represented by the 1925-27 average. Thereafter a sharp, though irregular, decline occurred until the index reached the low point of the depression—80 per cent below the 1929 peak—in the third week of March, 1933, at the time of the banking moratorium.

Following the sharp upturn and subsequent recession which occurred in the summer of 1933 the index has since fluctuated most of the time within a range between 40 and 60 per cent of the 1925-27 average. The recovery during the past winter and early spring finally brought the index in the second week of February to 68 per cent of the 1925-27 average—a higher level than at any time since the late spring of 1931. A substantial decline has since occurred, and the esti-

Be Measured Weekly by The Iron Age



...e used for the years 1925 to 1928 inclusive and weekly index numbers from 1928 ... 1925-27 = 100.

mated figure for the week ending June 1 is 51.6, a further decline from that of the week before and about the lowest level reached during the present year.

Construction of the Index

THE IRON AGE Weekly Index is a composite of five weekly statistical "series" reflecting activity in various branches of heavy industry. Basic statistical data currently included are (1) THE IRON AGE estimates of weekly ingot operating rates in the steel industry, (2) lumber production as reported by the National Lumber Manufacturers Association, (3) automobile production based on Cram's Automotive Reports, (4) heavy construction contract awards, computed by the *Engineering News Record*, and (5) the weekly index of productive activity in the Pittsburgh district as reported by the Bureau of Business Research of the University of Pittsburgh.

These provide the only reliable weekly measures of activity in capital goods which are available continuously since 1929. Although several important branches of heavy industry are not directly included, it is believed that these five series furnish a reasonably adequate indicator of activity in the capital goods industries as a whole. Some question may be raised regarding the inclusion of automobile production in an index of capital goods, in view of the fact that most automobiles are sold for personal rather than business use. It is obvious, however, that automobiles, like houses, constitute consumers' capital goods in the same sense as machinery and factory buildings are producers' capital. Purchase of either type of goods represents a capital outlay usually financed by a loan repaid out of future earnings rather than a payment out of current income. For this reason, and because the industry reflects conditions in a wide range of related machinery and equipment industries, automobile production has been included in the index. Inclusion of steel and lumber production needs no explanation in view of the outstanding importance of these industries. Lumber production, moreover, reflects activity in the erection and reno-

Iron Age Monthly and Weekly Index Numbers for Capital Goods Activity

	1925	Week Ending	1929	Week Ending	1930	Week Ending	1931	Week Ending	1932	Week Ending	1933
J	95.9	J 5	118.7	J 4	89.6	J 3	64.7	J 2	52.3	J 7	39.6
F	95.2	12	126.7	11	96.6	10	69.2	9	50.3	14	38.4
M	95.0	19	129.7	18	95.4	17	71.7	16	47.3	21	38.8
A	93.1	26	126.8	25	95.3	24	70.5	23	44.3	28	39.4
M	93.7	F 2	124.1	F 1	96.8	31	72.1	30	42.8	F 4	38.4
J	95.0	9	123.5	8	99.5	F 7	71.6	F 6	42.2	11	34.7
J	94.6	16	121.0	15	98.3	14	69.3	13	41.3	18	33.3
A	95.4	23	122.4	22	96.4	21	69.9	20	40.1	25	32.5
S	98.7	M 2	123.1	M 1	97.2	28	70.4	27	39.4	M 4	32.3
O	105.0	9	124.6	8	95.8	M 7	71.3	M 5	38.7	11	28.6
N	107.8	16	124.2	15	95.3	14	71.5	12	38.3	18	25.9
D	109.1	23	124.9	22	98.9	21	72.9	19	37.5	25	27.9
	1926	30	126.9	29	101.4	28	72.5	26	37.4	A 1	28.6
J	105.4	A 6	129.6	A 5	103.7	A 4	74.0	A 2	37.4	8	30.3
F	103.6	13	130.3	12	103.2	11	73.3	9	37.4	15	31.5
M	102.6	20	127.4	19	102.2	18	72.8	16	36.9	22	33.2
A	102.6	27	127.9	26	102.5	25	71.3	23	37.4	29	35.4
M	103.6	M 4	124.8	M 3	100.6	M 2	71.4	30	36.4	M 6	37.7
J	104.4	11	123.7	10	99.5	9	69.7	M 7	36.3	13	38.8
J	105.1	18	126.3	17	101.8	16	69.3	14	36.6	20	41.6
A	107.4	25	126.9	24	101.9	23	69.6	21	37.4	27	42.9
S	106.5	J 1	120.4	31	100.8	30	69.5	28	36.6	J 3	45.0
O	105.7	8	126.6	J 7	101.2	J 6	67.9	J 4	36.3	10	48.3
N	101.7	15	127.4	14	100.1	13	67.4	11	37.6	17	51.1
D	96.2	22	129.0	21	97.5	20	64.4	18	36.9	24	54.9
	1927	29	129.0	28	97.7	27	64.1	25	36.6	J 1	59.2
J	97.1	J 6	122.3	J 5	92.7	J 4	64.8	J 2	35.7	8	59.3
F	99.0	13	128.7	12	94.6	11	62.5	9	35.6	15	62.9
M	100.0	20	129.0	19	86.9	18	63.7	16	35.2	22	64.0
A	99.4	27	129.5	26	83.4	25	61.8	23	35.1	29	65.0
M	102.3	A 3	125.7	A 2	83.8	A 1	61.1	30	33.7	A 5	60.8
J	99.3	10	124.7	9	89.0	8	58.9	A 6	33.8	12	61.1
J	99.0	17	120.4	16	85.5	15	58.1	13	33.7	19	61.6
A	98.7	24	121.2	23	85.3	22	57.2	20	32.5	26	58.6
S	95.9	31	120.1	30	83.8	29	57.0	27	32.2	S 2	53.4
O	94.6	S 7	114.1	S 6	81.2	S 5	55.3	S 3	31.6	9	53.8
N	93.2	14	115.3	13	80.7	12	54.0	10	31.9	16	51.6
D	97.0	21	112.7	20	80.6	19	54.3	17	32.3	23	48.3
	1928	28	115.4	27	78.3	26	53.1	24	33.5	30	48.9
J	105.1	O 5	113.1	O 4	77.0	O 3	52.5	O 1	32.6	O 7	50.7
F	105.5	12	112.1	11	76.2	10	52.0	8	33.5	14	51.3
M	104.3	19	114.4	18	74.6	17	47.9	15	33.4	21	48.0
A	109.1	26	115.1	25	74.0	24	49.8	22	33.2	28	46.7
M	105.7	N 2	115.3	N 1	75.4	31	49.1	29	34.1	N 4	42.3
J	106.6	9	112.9	8	70.9	N 7	49.2	N 5	34.1	11	41.9
J	108.4	16	107.4	15	72.2	14	49.7	12	35.4	18	43.1
A	109.7	23	103.4	22	72.5	21	50.8	19	35.7	25	47.1
S	112.3	30	97.4	29	78.2	28	51.7	26	35.2	D 2	47.3
O	116.4	D 7	99.4	D 6	78.0	D 5	50.2	D 3	36.5	9	49.0
N	117.0	14	99.2	13	74.4	12	52.0	10	40.1	16	53.7
D	118.2	21	92.2	20	73.7	19	52.9	17	41.6	23	53.5
		28	80.4	27	67.7	26	55.7	24	40.1	30	54.5
								31	42.2		

vation of wood frame buildings, an important branch of the construction industry not represented by the *Engineering News Record* figures on contract awards, which are limited to the heavy types of engineering construction. The index compiled by the Pittsburgh Bureau of Business Research has been included because it measures activity in one of the most important capital goods manufacturing centers.

Adjustment for Seasonal Variations

In order to combine the separate series into composite form they were first placed on a comparable basis by expressing the figure for each week in each series as a percentage of the weekly average for 1929. Each of the separate series was then adjusted for the length of the working week and corrected for normal seasonal variations. In making these computations use was made of recognized procedures and seasonally adjusted series developed by the Federal Reserve Board, the Department of Commerce, the New York *Times* and other agencies as well as by special methods developed by THE IRON AGE. The construction figures of the *Engineering News Record* were subjected to special treatment because of their peculiar nature. The original dollar figures were translated into terms of physical volume of construction by means

(1925-27 average = 100)

Week Ending	1934	Week Ending	1935
J 6	50.3	J 5	62.4
13	49.9	12	64.2
20	50.7	19	65.3
27	53.2	26	63.7
F 3	56.2	F 2	67.5
10	57.5	9	68.0
17	58.4	16	66.0
24	58.7	23	63.8
M 3	58.8	M 2	62.8
10	59.9	9	62.5
17	61.3	16	63.1
24	60.6	23	63.0
31	59.6	30	63.4
A 7	59.8	A 6	60.0
14	60.6	13	59.9
21	61.3	20	58.4
28	63.1	27	57.1
M 5	61.4	M 4	55.7
12	60.8	11	51.7
19	60.4	18	52.2
26	59.6	25	54.5
J 2	56.8	J 1	51.6
9	60.6		
16	62.0		
23	60.8		
30	58.3		
J 7	41.3		
14	48.6		
21	48.6		
28	48.7		
A 4	50.2		
11	50.9		
18	48.7		
25	46.9		
S 1	39.9		
8	43.5		
15	43.4		
22	43.0		
29	43.6		
O 6	40.6		
13	42.5		
20	44.3		
27	41.4		
N 3	41.0		
10	42.0		
17	41.7		
24	43.1		
D 1	43.4		
8	47.1		
15	50.8		
22	56.0		
29	60.1		

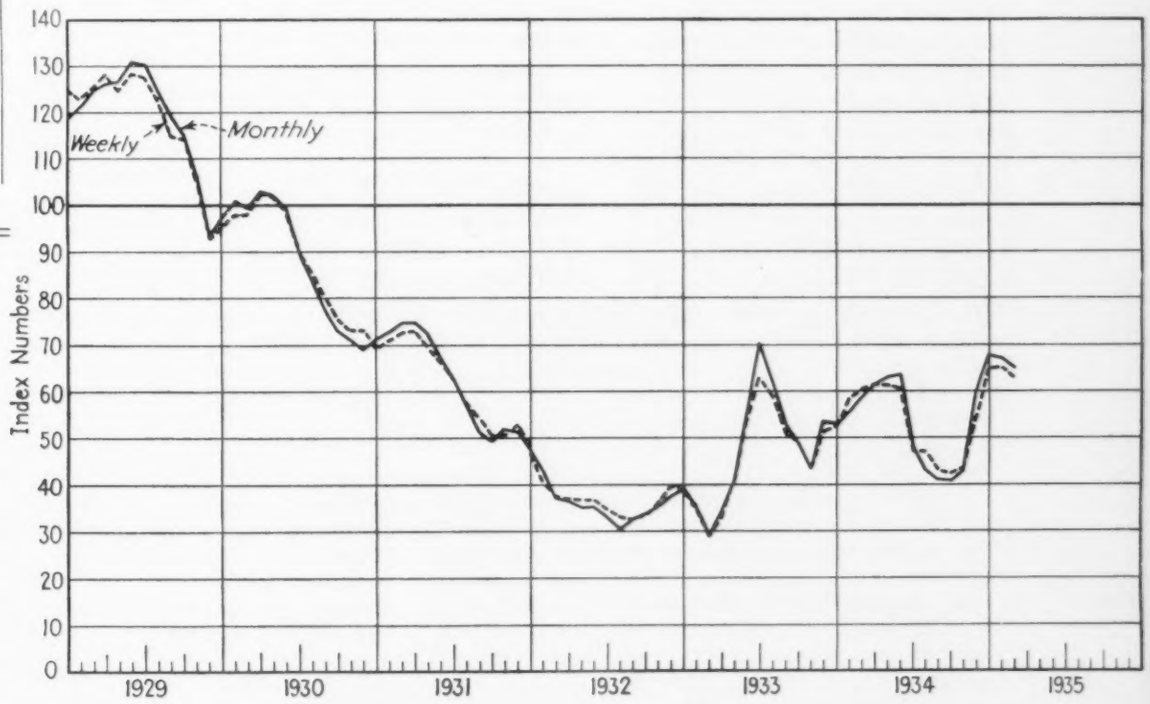
of the monthly construction cost index reported by that publication. Since the current figures measure the volume of contracts awarded during the week rather than the rate of operations, a 13-week average was then computed in order to reflect the approximate rate of construction activity. This adjusted series was then corrected for normal seasonal variations. The Pittsburgh index is published by the Bureau in seasonally adjusted form.

The five seasonally adjusted series were then combined into the composite index by assigning equal "weights" to each series. As they should be in an index of capital goods activities, the iron and steel and the construction industries are of preponderant importance in the composite, since, in addition to the two series representing these industries, the Pittsburgh index partially reflects steel operations and the lumber series relates closely to building activity.

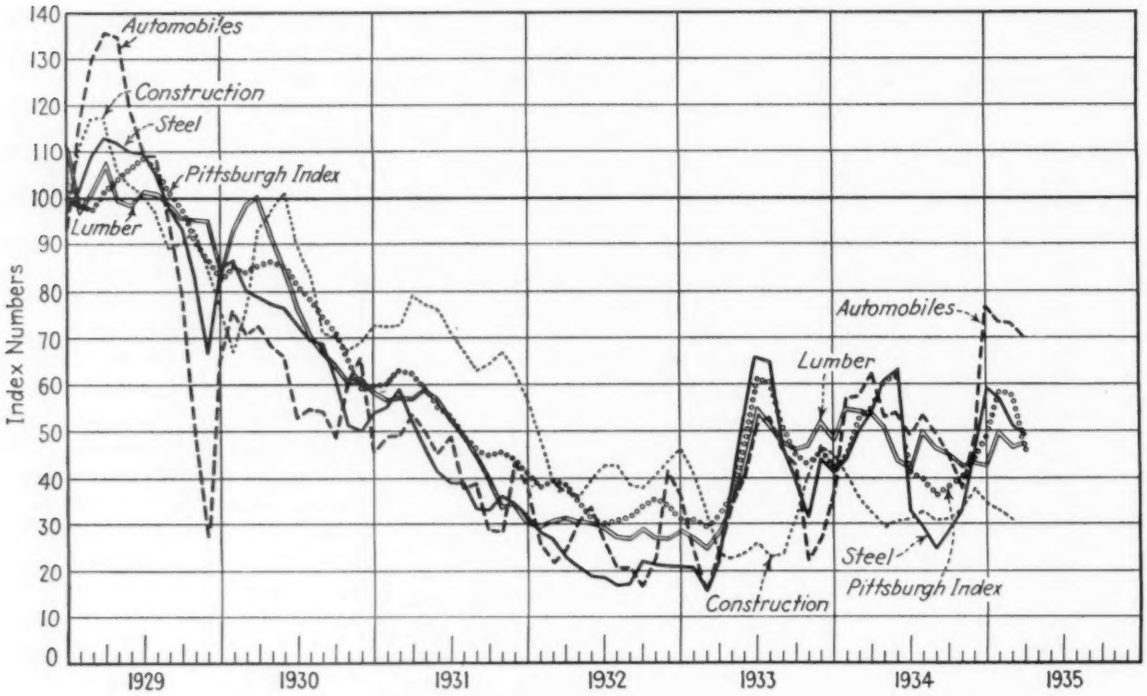
Reliability of the Index

In order to provide a means of testing the reliability of THE IRON AGE Weekly Index and to extend the record of activity in the capital goods industries back to the more "normal" period preceding 1929, a comprehensive monthly index covering the entire period from 1925 to date has also been computed. This index is a weighted composite of a much larger number of capital and durable goods industries represented in the Federal Reserve Board's monthly index of production and includes also monthly figures on heavy construction contract awards. Manufacturing industries represented include iron and steel, coke, various nonferrous metals, lumber, cement, polished plate glass, automobiles, locomotives and shipbuilding.

This monthly index can therefore be regarded as a wholly comprehensive measure of activity in the durable and capital goods industries. As a prompt measure of current changes, however, the usefulness of the monthly index is limited by the fact that the basic statistics needed in its compilation do not usually become available until nearly four weeks after the end



THE Iron Age Weekly Index of Capital Goods Activity compared with a more comprehensive monthly index of capital goods activity. The marked correlation demonstrates that the weekly index, besides providing a prompt measure of activity, loses nothing in reliability.



Components of The Iron Age Weekly Index of Capital Goods Activity by months. Average for 1929 = 100.

of the month to which they refer. THE IRON AGE weekly index number, on the other hand, will in the future be published in preliminary form by the middle of the following week.

That THE IRON AGE Weekly Index provides a reasonably close measure of capital goods activity is apparent from the chart showing a comparison of the fluctuations in the comprehensive monthly index with those of the Weekly Index for the period from 1929 to 1934. The two curves are in sufficiently close conformity throughout the entire period to justify dependence upon the Weekly Index. It should be emphasized, however, that slight erratic changes from week to week in any weekly index number are likely to be caused by accidental factors and may therefore be of limited significance except when they reflect a distinct trend continuing over a two or three-week period. Moreover, since the index number for the "latest week" will in the future be published within a few days after the end of the week and before all of the basic statistics are available, it must be partially estimated and is therefore subject to revision in the following issue.

Base Period for the Index

Monthly index numbers for the period from 1925 to 1928 and weekly index numbers from 1929 to date are presented in the accompanying table. As the three-year period from 1925 to 1927 appears to reflect the existence of reasonably stable conditions, this period has been used as a "base" in computation of the final index. The index number for each month or week, therefore, has been expressed as a percentage of the 1925-27 average as 100. Selection of this or any other base period, however, should not be interpreted to mean that the rate of activity then prevailing was "normal." There is every reason to believe, because of the growth of population if for no other reason, that a rate of operations in the capital goods industries sufficient to supply the nation's requirements 10 years ago would be inadequate to supply today's normal demands.

o o o

THE Iron Age index of capital goods activity was developed in consultation with and under the supervision of Dr. Frederic Dewhurst. He has been professor of industry, Wharton School of Finance and Commerce, University of Pennsylvania; chief of the statistical division, Federal Reserve Bank of Philadelphia; chief of statistical research division, Bureau of Foreign and Domestic Commerce, Washington; and economist, American Iron and Steel Institute. In 1928 he was a delegate to the international convention on government statistics which was held at Geneva, Switzerland.

The Foundry of 1950

o o o

By FRED J. WALLS
International Nickel Co., New York

o o o

NEW foundries, with ideal working conditions for employees, will replace present structures during the next 15 years. The specialty foundry and the larger production jobbing foundry will be the most successful units. Materials specifications will be raised, processes improved (especially proper use of the cupola), human variables eliminated, mathematical formulas substituted for guesswork. Men scientifically trained will be in control.

Mr. Walls, who assumes a prophetic role as author of this article, was chief metallurgist of the Wilson Foundry & Machine Co., Pontiac, Mich., for 10 years. In 1930 he was chosen to present the exchange paper of the American Foundrymen's Association before the Institute of British Foundrymen. This article is based on a paper presented before the sectional meeting of the American Foundrymen's Association at East Lansing, Mich., on May 11.

o o o

CHANGE is one of the things of which we are absolutely sure. The foundry of today will be different tomorrow. It is a simple matter for all of us to look back 15 years and comprehend the progress that has taken place in the art of founding, but not one of us is capable of definitely foretelling what the science of founding will be 15 years hence. Founding used to be an art surrounded with mysteries and fortified by the secrets of men (molders and melters) who held them back for fear that their neighbors would become more proficient and steal their jobs. We have passed from the stage wherein personal experience was the only factor in success to the stage of scientific control of materials and processes. Both the practical man and the technical man must realize that the other man's contributions are of equal importance in this progress if this visionary foundry shall become an actuality.

There seems to be a natural law that regulates the advance of science. Where only accidental observations can be made, the growth of knowledge creeps, but where organized laboratory experiments can be carried on, knowledge leaps forward. Research today becomes the beacon of tomorrow.

Location Will Be Important

With these thoughts in mind, I will attempt to describe my conceptions of a foundry in 1950. First of all, we must have a location for this foundry. Transportation and availability of materials will not be primary factors, but rather labor and living conditions which are bound to be more favorable in decentralized localities. There is plenty of non-productive soil, most of which is already plotted and grown up with weeds on some of which the 1950 foundries will be built. There is no question but that in a large majority of cases it will be found more economical to construct new buildings than attempt to revamp existing foundries to conform to regulations that will be enacted with respect to the sanitation and health protection for labor.

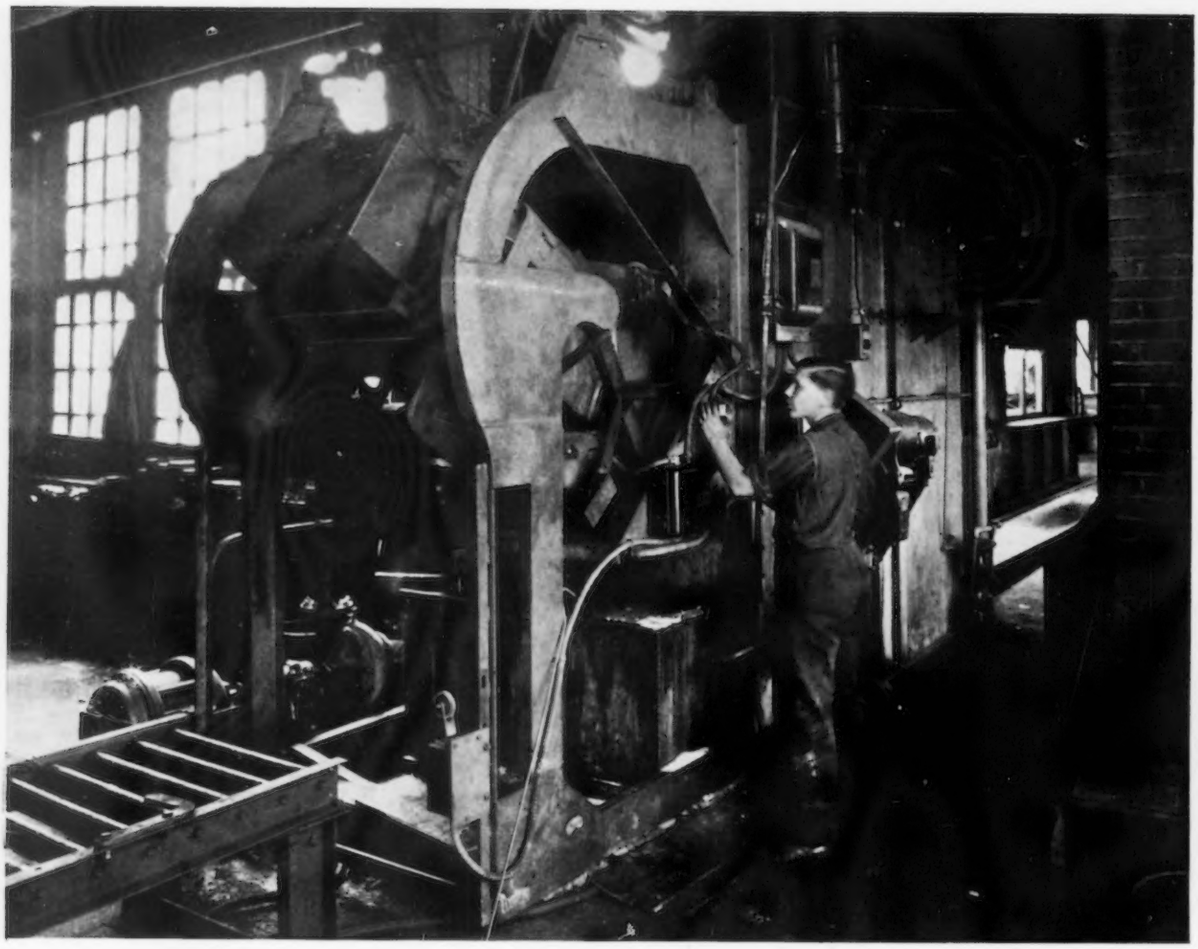
Plants Will Fall Into Four Main Groups

Foundries will probably be grouped under four general headings:

1. Specialty (one commodity, such as piston rings).
2. General jobbing (small quantities).
3. Production jobbing (large quantities).
4. Corporation foundries (complete lines).

Of course, there will always be in existence small jobbing foundries making castings which do not require special properties. It will be impossible for any one person to become sufficiently posted on all the scientific problems involved in foundry processes, thus making it necessary to employ a group of specialists technically trained in the various sciences. This increases overhead expense, and inasmuch as economy will be the watchword in 1950, just as it is now, there must be volume over which to spread this additional cost. Thus it will be seen that the specialty foundry, where possibly

(CONTINUED ON PAGE 78)



LOADED tote box, having been raised on elevator, being automatically dumped. Bolts slide through a chute into a revolving spiral vane washing drum. o o o

Cost of Heat-Treating Bolts Cut By

FORMING of threads is one of the most important operations in the manufacture of bolts and screws. In the plant of the Oliver Iron & Steel Corpn., a sulphur base oil has been found to be one of the best lubricants for bolt thread cutting dies and is almost universally used for this purpose. After finishing, all bolts are conveyed to the heat-treating department and are heat treated in one of 10 batch-type electric furnaces of the forced convection design.

In the past, it was found that the presence of the sulphur base oil which adheres to the bolts not only caused discoloration and apparent oxidation of the surface of the product, but was excessively damaging to the electric furnace. It was discovered that an accumulation of red oxide appearance and of complex chemical structure was formed in the spiral electric heating elements. The effect of this accumulation was partly to insulate the heating element, the sulphur content also causing rapid corrosion. The high cost of furnace maintenance, due to the short life of expensive heating elements, resulted in an extended search by the company to find a method of reducing heat-treating costs.

The outcome was the installation of bolt washing equipment to remove all oil and grime from the bolts before heat treatment. The life of the heating elements was immediately more than doubled, thereby considerably reducing heat treating costs. In addition, the economy of fewer shutdown periods is obvious, and the quality of products from these furnaces is much improved as to surface appearance and physical characteristics.

Bolts are brought to the washing machine in tote boxes on a roller conveyor. Each tote box is 2 ft. wide, 3 ft. long, and 18 in.

WASHED empty tote box is lowered at discharge end of washing machine by special brake-controlled arms to conveyor. After the box is filled with washed bolts, the conveyor carries it to the heat-treating department.

Efficient Cleaning

By CHARLES D. OVERLY
Chief Engineer, Oliver Iron & Steel Corpn., Pittsburgh

deep, weigh 200 lb. empty, and may contain as much as 2000 lb. of bolts. To insure thorough cleaning, the bolts and tote box must be washed separately. Due to space limitations, the machine could be no wider than 5½ ft.

The loaded tote box on the conveyor is rolled on to an elevator, raised by push button control to the proper position, and automatically dumped, the bolts sliding into a chute which carries them into a revolving spiral vane drum. Bolts, while being washed, are gently tumbled in this drum. In the first half of the drum the bolts are submerged in a washing solution to loosen the oil and grime. The latter half of the drum is perforated so that the bolts are subjected to high velocity sprays from special non-clogging nozzles.

In the meantime, the elevator has deposited the empty tote box in the upper portion of the machine, where it is moved automatically in an upside-down position over vertical sprays which wash the inside and edges. Thus a clean box receives the clean bolts as they feed from the drum at the discharge end. For facility in handling, at the start of the day's work, an empty tote box is first passed through the machine to receive the bolts from the succeeding tote box.

The washing solution is heated with live steam and is maintained at about 180 deg. F. by automatic temperature control. The bolts leave the machine clean, free of small chips and dirt, and hot enough to dry off any remaining moisture. The washed empty tote box is lowered at the discharge end by special brake-controlled arms to the conveyor which, after the box has received its load of washed bolts, carries it to the heat-treating department.

The machine is located on the third floor in an 8-ft. corridor in

(CONTINUED ON PAGE 88)

Zinc Ammonium Chloride: Its Place

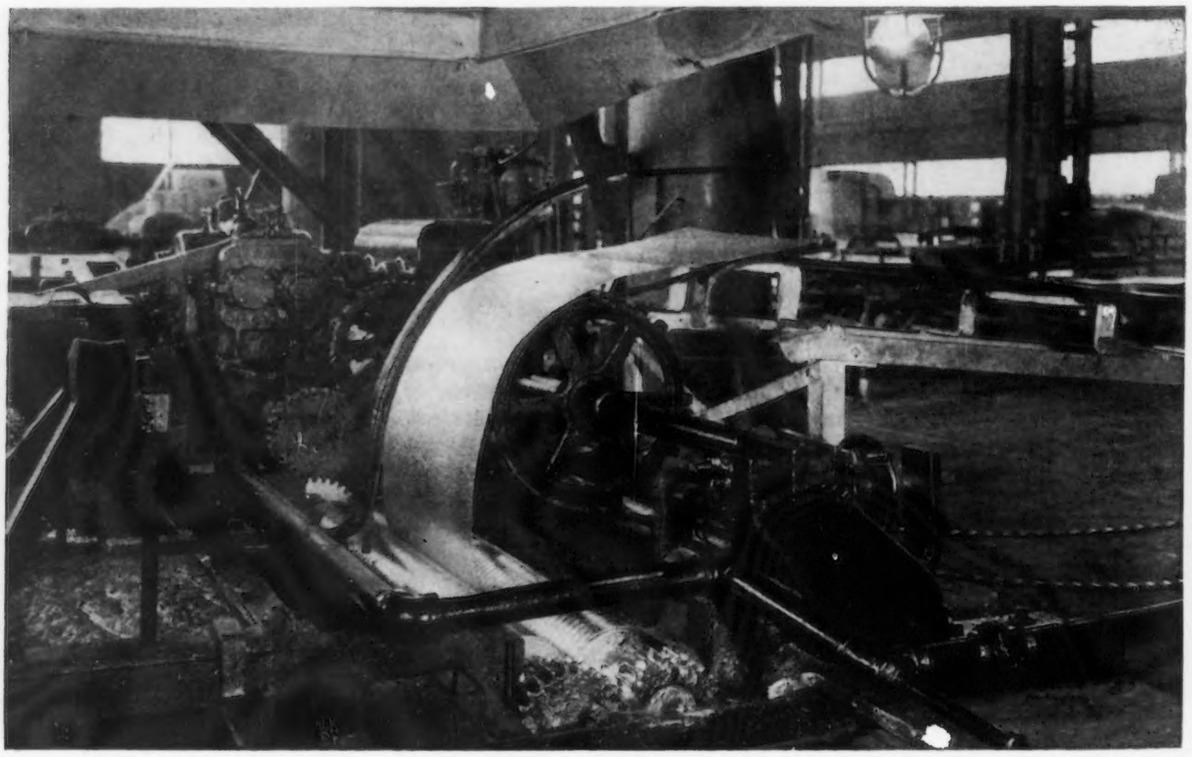
IN this article, the second of a series of three, the author continues his historical resume of galvanizing fluxes, with particular reference to the development of zinc ammonium chloride. A description is given of types of zinc ammonium chloride now available on the market, and various advantages and disadvantages of its use are mentioned. In conclusion, a review is started of modern galvanizing practices using zinc ammonium chloride.

o o o

ZINC ammonium chloride[17], a chemical combination of zinc chloride and ammonium chloride or sal ammoniac, is first described in detail by J. I. Pierre, a French chemist, in the "Journal Ann. Chem. and Phys.," 1846. His reference is followed by those of K. F. Rammelsberg, a German mineralogist, in the "Pogg. Annalen," 1855, and by J. C. de Marignac, a Swiss chemist, in "Jahresber," 1857. Each of these three technologists discussed a double salt having a zinc chloride to ammonium chloride ratio of one to two. This ratio absorbs moisture readily and is seldom found today in our galvanizing plants, having been supplanted by the non-hydroscopic one to three ratio, which is referred to by P. A. Meerburg, of Germany in the "Zeitsch Anorg Chem.," 1903, and by Baxter and Lamb of this country in the "American Chemical Journal," 1904.

The first commercial production and use of zinc ammonium chloride as a galvanizing flux was in Germany during the early part of the present century. Its progress and adoption by the galvanizing world as a whole would appear to have been slow, for in 1916 W. T. Flanders, in his volume, "Galvanizing and Tinning," makes this reference to zinc ammonium chloride:

[17] Inorganic Chemistry, J. Newton Friend, Vol. 3, Part 2, Pages 112-113.



A TYPICAL scene in the galvanizing of steel sheets. This sheet is emerging from the exit rolls of a galvanizing pot at the plant of The Eastern Rolling Mill Company, Baltimore.

o o o

in Modern Galvanizing

By H. G. HOBBS
Steel Service Engineer, Cleveland

"The use of zinc ammonium chloride on the galvanizing bath as a substitute for sal ammoniac is comparatively a new idea. As a matter of fact, it is only used at this writing by comparatively few companies."

The original sponsors and manufacturers of zinc ammonium chloride are believed by some to have had in mind its advantages as a flux, in that when put on molten zinc it formed an almost instantaneous liquid zinc chloride body with the consequent entrapment of the ammonium chloride content of the flux, thus bringing about a more economical flux than straight sal ammoniac. This belief can be questioned in view of the large amount of "sal fumes" which escapes when zinc ammonium chloride is put on molten zinc, and in view of the fact that each flux forms its own zinc chloride liquid flux which, after the initial or new flux is made up, automatically presents this liquid body or trap for any further additions of dry flux. It would seem more reasonable to assume that the introduction of zinc ammonium chloride was due to the belief that there was a need and a market for a flux which, like zinc chloride, would be substantially neutral when in solution, yet possess the efficiency of sal ammoniac when used on molten zinc.

From a color, type of crystal, non-hydroscopic, and handling point of view, zinc ammonium chloride resembles sal ammoniac except in those analyses carrying a high ratio of zinc chloride, in which case the complete salt becomes hydroscopic and readily absorbs moisture.

Time and experience have brought about improvements in the analysis and manufacture of this product. Some of the original claims made for it, one of which was equal life, speed and intensity of fluxing with sal ammoniac when used on molten zinc, have not worked out in practice, but there is no doubt that, properly used, it does show to advantage over zinc chloride or sal ammoniac on certain major types of galvanizing.

Several Types Available

Zinc ammonium chloride is manufactured in several countries, and most manufacturers are making more than the one analysis or ratio of zinc chloride to ammonium chloride. However, today's requirements of zinc ammonium chloride for galvanizing in this country are for the most part filled by three different makes or brands. One, a domestic product and marketed

HAND-DIP galvanizing of tubs. The man on the extreme left is immersing cleaned and fluxed tubs into the zinc bath. The tubs travel under a bridge and are taken from the galvanizing bath, as shown here.

as zinc ammonium chloride, has a type analysis as shown in Table III.

TABLE III

Type Analysis of a Domestic Zinc Ammonium Chloride

Zinc Chloride	$ZnCl_2$	46 per cent
Ammonium Chloride	NH_4Cl	53 per cent
Moisture		under 1 per cent

Molecular Ratio, $ZnCl_2$:NH_4Cl, 1:3.
Analysis made March, 1934.

The second, a foreign product and marketed under a trade name, has a type analysis as shown in Table IV.

TABLE IV

Type Analysis of Foreign Brand of Zinc Ammonium Chloride

Zinc Chloride	$ZnCl_2$	48 per cent
Ammonium Chloride	NH_4Cl	52 per cent
Moisture		under 1 per cent

Molecular Ratio, $ZnCl_2$:NH_4Cl, 1:2.7.
Analysis made March, 1934.

The third, a domestic product containing a foaming agent and marketed under a trade name has a type analysis as shown in Table V.

Although these analyses all show different amounts of zinc chloride and ammonium chloride, and a different ratio of the one salt to the other, all of them for all practical galvanizing purposes are the same product and used with the same practice each should show equally good results.

It has often been stated that, within limits, the exact percentage of each salt used and the ratio of the one salt to the other is not one of primary importance in the use of this product as a galvanizing flux. This statement is borne out by the fact that of the many analyses of the above-mentioned grades of zinc ammonium chloride seen by the writer, no one grade has analyzed twice the same.

Advantages of Zinc Ammonium Chloride

Used in the "bosh" tank as a liquid flux or deoxidizer in the place of hydrochloric acid, zinc ammonium chloride has several economic and other advantages. Ordinary steel tanks can be used to contain cold solutions and, while the solution will corrode the tank to a certain extent, the use of steel tanks is feasible and economical. The use of a hot solution will naturally increase the rate of corrosion. Considerable economy is effected in that dumping of the solution is not necessary until outside dirt and contamination make it impractical to use. This follows from the fact that the flux attacks the material immersed in it only to a very small extent.

It is of extreme interest to note that there are a great many plants where nothing has been required to keep a solution of zinc ammonium chloride in daily use for over a year other than additions of water and solid flux to restore it to its original volume and strength.

The liquid solution gives instantaneous and more thorough fluxing to fabricated material having corners, sockets, threads, etc., than that which can be obtained with a thick volatilizing flux on the surface of the molten zinc through which material in nearly every case quickly passes.

When the solution is used cold and in conjunction with a volatilizing flux on the molten zinc, the coating of wet flux, which adheres to the material after immersion in the solution, strengthens the volatilizing flux. Consumption figures for this operation have shown that for each 100 lb. of solid flux used, approximately 40 lb. is consumed by the liquid solution and 60 lb. by the volatilizing flux.

As it is substantially neutral, material coated with this solution will resist oxidation for long periods of time, these periods depending upon the strength of the solution. This applies to the material while wet, and after drying either from the heat of the solution or from a "hot plate."

Hydrochloric Acid Eliminated

The use of a volatilizing flux on the surface of the zinc bath can be eliminated when the material to be galvanized is of such character and shape that a hot solution can be used with consequent self-drying of the material. This is likewise true where the material, fluxed in a cold solution, is placed on a "hot plate" to dry.

Zinc ammonium chloride in solution will work equally well with sal ammoniac as the volatilizing flux on the surface of the zinc bath, if this latter flux is required.

There is no questioning the fact that the use of hydrochloric acid in the "bosh" tank is directly and indirectly responsible for a large portion of the overall cost of galvanizing, and that the use of a zinc ammonium chloride solution with consequent elimination of hydrochloric acid is of considerable merit, especially from the viewpoint of dross formation and attack on the galvanizing machine and flux box.

The attack by hydrochloric acid on material immersed in it forms iron chloride; this not only makes frequent dumping of the solution necessary but, in adhering to material immersed in the acid solution and carried on into the molten zinc, its free iron content is attacked and dissolved by the zinc, forming dross. The seriousness of this action can be gaged by figures obtained during two weeks' observation and testing in the galvaniz-

TABLE V

Type Analysis of a Domestic Zinc Ammonium Chloride with Foaming Agent

		No. 1	No. 2
Zinc Chloride	$ZnCl_2$	44.9%	35.8%
Ammonium Chloride	NH_4Cl	52.3%	55.6%
Presumably Zinc Amino Chloride	$ZnCl_2.6NH_3$	...	8.8%
Foaming Agent		0.50%	0.20%
Moisture		under 1 %	under 1 %

1. Molecular Ratio, $ZnCl_2$:NH_4Cl, 1:3.
2. Molecular Ratio, $ZnCl_2$:NH_4Cl, 1:3.95.

1. Analysis made March, 1934.
2. Analysis made November, 1934.

ing department of a large sheet mill.

Samples of hydrochloric acid solution, in four "bosh" tanks receiving daily use, were analyzed for ferrous chloride at frequent intervals during the life of the solutions. This life in some cases was two weeks and one week in others. The average $FeCl_2$ (iron chloride) content of each tank during its life ran from 1.27 per cent to 1.63 per cent, or an average on all four tanks of 1.46 per cent. This figure was then calculated from known chemical formula, as shown in Table VI.

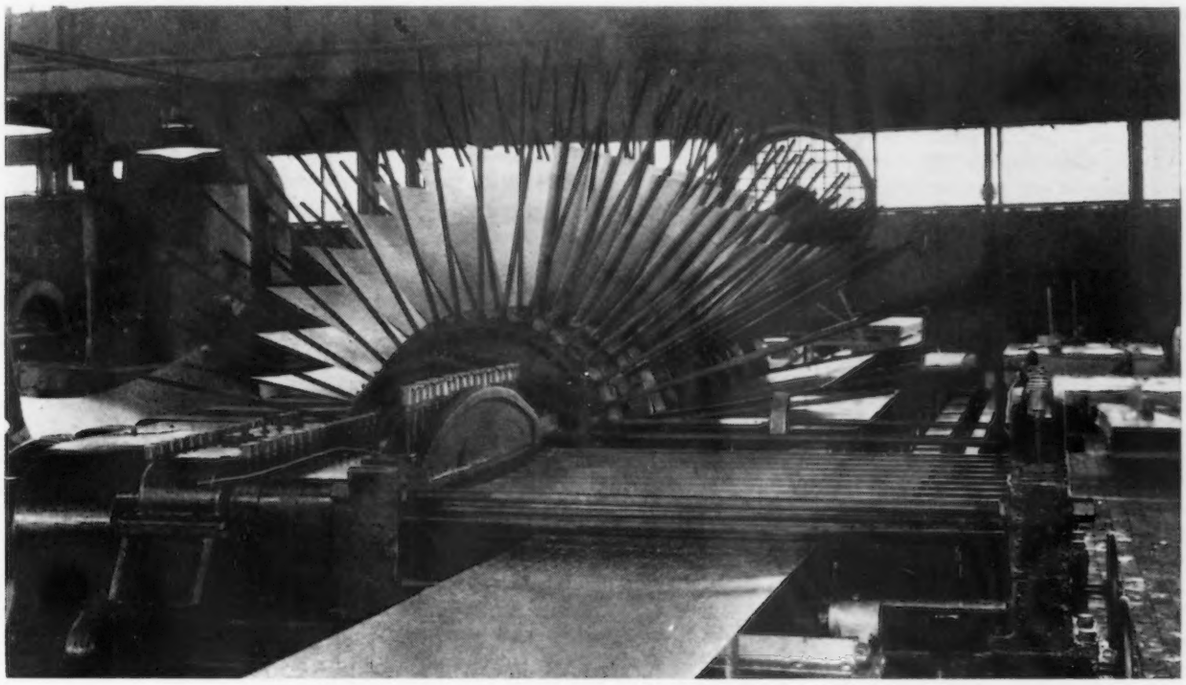
Repeated testing showed that the average amount of solution carried by a sheet into the flux box was 0.02 lb. per sq. ft. of sheet. Assuming the production per pot to be 2000 sheets (36 by 96-in. merchant stock) per 8-hr. shift, with a full week totaling 6 days or 18 shifts, the week's production would amount to 36,000 sheets.

A 36 by 96-in. sheet has 24 sq. ft., and at 0.02 lb. of solution per sq. ft. would carry 0.48 lb. of solution into the pot; therefore 36,000 sheets would carry 17,280 lb. of solution, and this number of pounds of a 1.46 per cent solution would theoretically form the dross shown in Table VI.

It would now be advisable to consider some of the disadvantages of zinc ammonium chloride. This flux has a unit or per pound cost equal to, and in some cases higher than that of sal ammoniac. Likewise the amount of zinc ammonium chloride required to make up a liquid fluxing solution sufficiently strong as to be serviceable and to keep it at this strength is so large that many galvanizers will not consider it, despite the advantages obtained by its use.

With few exceptions a zinc ammonium chloride fluxing solution must be stronger than 8° Bé. to be at all serviceable, and most operations require an average working strength of 15° to 20° Bé. Using the latter strength as an example, the amount of solid zinc ammonium chloride of a 1 to 3 molecular ratio, which is required to make up one gallon of a hot (160 deg. F.) 20° Bé. solution is approximately 4.5 lb.; for a cold (60 deg. F.) solution, approximately 3.9 lb. is required. Inasmuch as the smallest galvanizing operation, both as to quantity and size of material, usually requires a "bosh" or liquid fluxing solution of 200 to 300 gallons of solution, the initial charge for a hot solution would be 900 to 1350 lb. of solid flux.

Thorough rinsing equipment and facilities are essential; for, unless the material to be fluxed and galvanized is thoroughly rinsed, the acid "carry over" from the pickling tank eventually will contaminate the liquid flux to the point where, in spite of its strength, it will lose to a great extent its value as an oxidation preventative and also as an eliminator of iron sulphate or iron chloride being carried over into the molten zinc.



GALVANIZED sheets going through a roller level onto a cooling wheel. In the galvanizing of sheets, sal ammoniac is still used, as zinc ammonium chloride has not had much success as a flux. This view is by courtesy of The Eastern Rolling Mill Co.

Has Not High Fluxing Speed

As a liquid flux, zinc ammonium chloride will not remove any but the most primary oxide which may form on the material between the pickling and rinsing operation, and between the latter operation and fluxing; thus a breakdown or a "hold up" occurring between any of these operations may necessitate a repickling which would not be required were hydrochloric acid used in the "bosh" tank.

The use of this liquid fluxing solution does not eliminate the necessity of having a volatilizing flux with a foaming agent on top of the galvanizing pot. An exception to this is noted in those cases where the combination of two factors, i.e., where the material to be galvanized is of such shape as to

induce quick and thorough drying, and the use of a hot fluxing solution and possibly of a "hot plate," produces complete drying and the necessary preheating of the material before it is immersed into the molten zinc.

Due to its lower ammonia content, zinc ammonium chloride, when used as a volatilizing flux on top of the molten zinc, does not have the speed of fluxing the "bite" or the life of sal ammoniac.

This article will not attempt to cover all of the details which comprise the complete practice or operation used in galvanizing the various grades and shapes of iron and steel, but will be confined, with one or two exceptions, to a description of that portion of each practice which makes use of zinc ammonium chloride as a liquid and volatilizing flux.

Malleable Gray Iron Castings

The first phase to be considered is the galvanizing of malleable and gray iron castings. Inasmuch as one of the greatest and most costly sources of trouble encountered in the galvanizing of castings comes from sand incrusted and improperly cleaned castings or from those overpickled to the point where they will not properly coat, it would be advisable to discuss the proper cleaning of castings for galvanizing before describing the subsequent fluxing operation.

In the majority of plants making castings which are to be galvanized, the preliminary removal of the incrusted sand is done by sand blasting or shot tumbling in a department which is usually under the supervision of the foundry superintendent; the final and complete removal of the sand from the casting is done with a hot hydrofluoric and hydrochloric or sulphuric acid pickling solution in the galvanizing room under the supervision of the galvanizing foreman.

Other than to remove the dust which emanates from the sandblast or shot machines and to slightly touch or break the surface which has been made smooth by blasting or tumbling, castings properly sandblasted or tumbled require little or no pickling, and should receive none other than a short dip in a warm low-strength sulphuric or hydrochloric acid solution to give them the cleaning and touching already mentioned.

However, in a good many cases, hydrofluoric acid must necessarily be used to remove the sand still found incrusted on the castings due to poor and inadequate blasting or tumbling equipment. Also, hydrofluoric acid cleaning is often necessary due to the fact that the foundry superintendent has his idea as to how properly cleaned castings should look, and his idea carries more weight with the plant executives than the complaints of the galvanizing foreman about the improperly cleaned castings he is forced to accept.

Generally speaking, in terms of less than carload lots, hydrofluoric acid is six times as expensive as hydrochloric acid and twelve times as expensive as 60° Bé. sulphuric acid. Hydrofluoric acid does remove the sand from the castings, but by the time this has been accomplished the rest of the casting has been so overpickled and has become so covered with "acid black" that a portion of the pickled load is ruined, while the balance presents a serious obstacle to an economical and good job of galvanizing. Should the load of castings be removed from the pickling solution in time to keep it from being overpickled, then that portion of the load from which the sand has not been completely removed and which will not properly coat is such as to give a high percentage of rejects.

An excessively high consumption and waste of this high-priced acid and of the other pickling acids, with an unnecessarily high flux and zinc consumption and a high percentage of rejects, are all part of the cost of using hydrofluoric acid with or without another acid to do the work which should have been done in the sandblast or tumbling department.

It is not to be inferred that all castings properly sandblasted or tumbled will enter the galvanizing

TABLE VI

Hydrochloric Acid Contamination of Molten Zinc

1 lb. of 1.46 per cent $FeCl_2$ (iron chloride) Solution	= 0.0146 lb. $FeCl_2$, (ferrous chloride) = 0.00644 lb. Fe, (iron) = 0.0919 lb. Dross (analyzing 93 per cent zinc, 7 per cent iron)
17,280 lb. of 1.46 per cent $FeCl_2$ (iron chloride) solution	= 253 lb. $FeCl_2$, (ferrous chloride) = 110.6 lb. Fe, (iron) = 1588 lb. Dross (analyzing 93 per cent zinc, 7 per cent iron)

TABLE VII

Methods Used in Galvanizing Sheets with Zinc Ammonium Chloride

	Zinc Ammonium Chloride Liquid Flux	Drying and Preheating of Sheets	Volatilizing Flux on Molten Zinc
Method No. 1	Hot Solution, 15° to 30° Bé. 180 to 200 deg. F.	None, other than that obtained from the heat of the solution.	None
Method No. 2	Hot Solution, 15° to 30° Bé. 180 to 200 deg. F.	Preheated in an oven to the point where the sheets are thoroughly dry and the buckling or "cobbling" of thin gage sheets from temperature change minimized.	None
Method No. 3	Cold Solution 3° to 20° Bé.	None.	Normal depth flux of zinc ammonium chloride or sal ammoniac with foaming agent carried.

department entirely free of sand, but the portion to which sand still adheres will be so small that the use of hydrofluoric acid and intensive pickling with other acids can be eliminated, and the galvanized rejects, because of this sand, can be accepted with little or no concern.

Hot Water Rinse Advised

Given castings property sandblasted or tumbled, their final cleaning should be done with a two to three minutes immersion in a warm (120 deg. F.), 3 to 4 per cent sulphuric acid solution. Sulphuric acid is referred to specifically inasmuch as it is cheaper than hydrochloric acid and does the cleaning equally well. Should sand incrusted castings demand the use of hydrofluoric acid, it would be added to the above described sulphuric solution in the strength of one part hydrofluoric to four parts sulphuric, and the pickling time would be increased to six or seven minutes with no change in the temperature of the solution. Castings so incrusted with sand as to require longer periods of pickling in stronger solutions and at higher temperatures than the solution just described should be returned to the sandblast or tumbling department for recleaning. Dumping of the described solutions should be done at the end of each week's operation, unless iron or other contamination warrants it at more frequent intervals.

The pickled castings should be rinsed thoroughly in boiling water; this temperature is advised in order that the castings will quickly dry and not carry rinse-water into the liquid flux thereby diluting it. The one exception to the use of a boiling water rinse is where slow handling between the rinse and flux tank allows the castings to become heavily coated with rust. In such cases the rinse water is kept cold, and care is taken to thoroughly drain the castings before immersion into the flux tank. In all cases, in order to expedite this draining, the loading baskets, made of acid resisting metal, should be well perforated and of a type that can be tilted freely while suspended in the air.

The liquid zinc ammonium chloride fluxing solution into which the castings are now immersed should be hot, 180 to 200 deg. F., and should be kept at an average strength of 15 deg. Bé. The necessary temperature is maintained by an open-end steam line into the solution or, preferably, by the use of heating coils. This follows from the fact that the open steam line is a constant source of expense with its steady diluting of the solution. The castings should remain in the solution until thoroughly coated with flux; this, in a proper strength solution, is only a matter of seconds. A slab of zinc, or more than one if there is a large volume of solution, is kept in the flux tank at all times in order to consume any acid which may be carried over by the pickled and rinsed castings. In an average plant the solution will be serviceable until it becomes more or less saturated with dirt and other contamination.

The use of a hot zinc ammonium chloride fluxing solution naturally presupposes that the molten zinc will carry little or no volatilizing flux on its surface and that the fluxed castings will be thoroughly dry before immersion into it. Where necessary, this drying is assisted or accomplished by dumping the castings on a "hot plate," and after drying and preheating they are ready to be galvanized. The "hot plate" in most cases is merely a heavy steel plate, heated from underneath by the exhaust flame or heat from the galvanizing kettle. However, the exceedingly high temperature which this plate can attain from this method of heating, and the pickup of moisture and flux from the castings often results in corrosion of the plate which in turn contaminates the castings. Thus it is advisable to have a second "hot plate" placed on top of the first plate with separation attained through the use of several single bricks placed flat between the two plates. This air space between the plates materially reduces the temperature of the top plate, and with this plate well perforated (⅜ in. holes on ½ in. centers), a well or space is also provided for draining the castings which may be drying on it.

A satisfactory and economical second or top "hot plate," and one that will insure the castings entering the molten zinc in a clean condition, can be obtained by the use of a wooden mat made of 1 by 1 in. lumber, each piece spaced ¼ in. apart. This mat is held together and strengthened by cross pieces underneath and all nails are sunk below the surface of the wood. A mat of this type, properly constructed has many advantages from a point of cleanliness, and will last a considerable length of time.

A volatilizing flux covering the surface of the molten zinc is not necessary when the fluxed castings have been thoroughly dried and preheated. But to prevent the formation of zinc ash on its surface, it is well to allow the "white fines" or other dry flux used to clean and strip the galvanized castings to drop on to the surface of the kettle, there to form a thin skin of volatilizing flux. The actual galvanizing operation and finishing after galvanizing are the same as when using sal ammoniac and hydrochloric acid.

The alternative use of liquid zinc ammonium chloride as a hot flux is, of course, its use as a cold flux with no "hot plate," but with a volatilizing flux on the surface of the molten zinc of sufficient depth, obtained by the use of a foaming agent, to reduce splattering. The strength of this volatilizing flux will be maintained by the wet flux carried into it on the castings which are being galvanized, by the drippings from the "white fines" used and, when necessary, by hand additions of solid flux. The cold liquid flux is operated in the same manner as the hot solution and at the same strength.

Sheet Galvanizing

In one of his many articles on galvanizing, Dr. Heinz Bablik of Germany describes the European practice of hot-dip sheet galvanizing in which the sheets are pickled in a highly concentrated solution of hydrochloric acid, rinsed in warm water and then dipped into a warm solution of highly concentrated zinc chloride. After removal from this fluxing solution, the sheets are dried and are then dipped into the molten zinc. This zinc does not carry any flux on its surface as the sheets are already coated with flux from the zinc chloride solution.

There have been many attempts made in America to use the European method in high-speed galvanizing of sheets, in a good many cases substituting zinc ammonium chloride for zinc chloride. But, so far, none of these attempts has met with sufficient success to warrant its adoption in preference to the accepted practice in this

(CONTINUED ON PAGE 90)

Modern Metals in

RAYMOND LOEWY, industrial designer, New York, creator of the Pennsylvania Railroad's new streamlined electric locomotives, the Hupmobile, the unique rotary filling station of Standard Oil Company of New Jersey, the 1935 Coldspot refrigerator, and many other capital and consumer goods wherein new metals and finishes are combined for utility, simplicity and beauty.

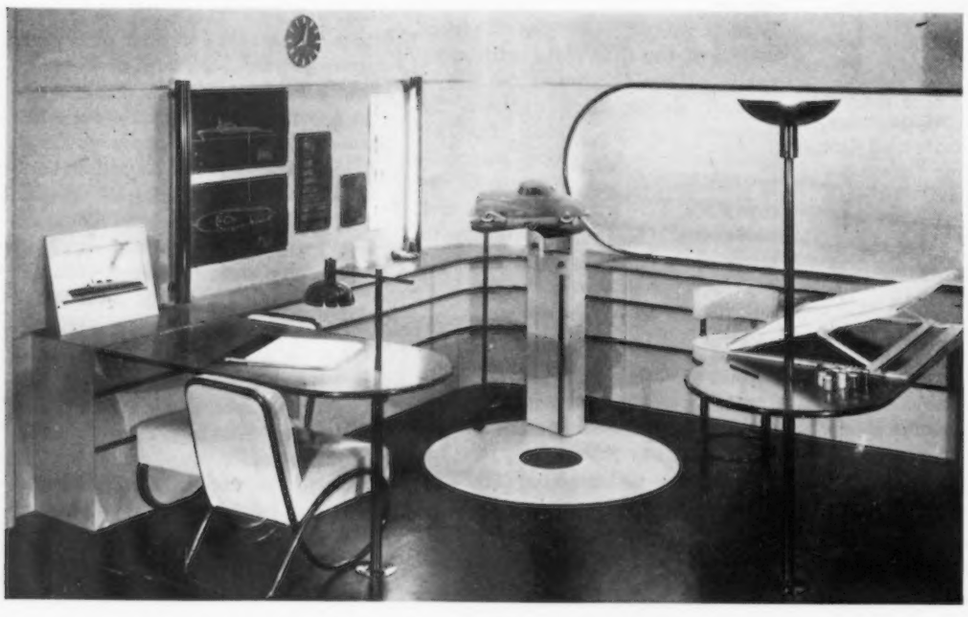
o o o

TO the modern industrial designer, metallurgy offers a variety of metals for every purpose he has in mind. With many tones and finishes available in alloys possessing high physical properties, he can meet almost any requirement. For the first time, instead of having to adapt his ideas to a limited selection, the designer has available a diversity of metals from which to choose.

In the designer's task of making useful articles attractive, the modern stainless alloys are of the greatest aid. Whether he be designing household gadgets or steam locomotives he will find one of these metals which is economically practicable, attractive in appearance, and efficient in service. He may dream of transforming a heavy lumbering train into a slim silver streak; he makes his dream come true in stainless steel. He may want household furniture which will be good-looking, durable and impervious to rust; he has at hand several metals in which to develop his ideas.

Among the first white metals were the nickel silvers, nickel plate and chromium plate. In the deeper shades were copper, brass and bronze. Then the stain-resisting alloys were added — Monel metal, stainless steel and aluminum. Now greater color variety is offered by the development of warmer tones of nickel silver and of such dark finishes as black nickel plate. The designer has but to choose his medium from the generous selection offered by metallurgy.

Stainless metals, because of their strength, their resistance to corrosion and their moderate cost, form the backbone of the modern trend. In the utilization of these metals,



AT LEFT

THE office of an industrial designer should be adapted to its function. It is really a clinic — a place where things are examined, studied and diagnosed. The office calls for a large amount of closet and storage space where component parts may be readily accessible, easily identified and kept together. We therefore have a room with light colored washable walls, linoleum floor, scientific lighting and the clean, straightforward lines of modern furnishings.

AT RIGHT

THIS rotary type of filling station has just received the first patent ever granted on a service station. The buildings are of structural steel and have fronts of porcelained steel. Stainless steel is used as an interior trim; the color scheme is red, white and blue.

Modern Designing

By RAYMOND LOEWY

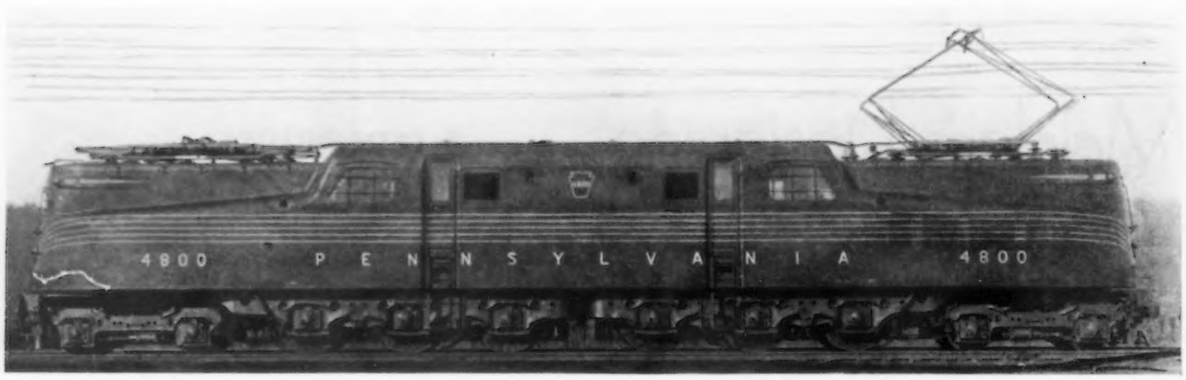
for everything from pencil sharpeners to trains, we find the most frequent example of cooperation between metal-worker and designer. To my mind the development of stainless steel transportation units is a particularly good example, showing as it does the trend toward constructional use of these metals and toward streamlined design. Magazines and newspapers have already carried many articles dealing with the economies effected by the four to six-car stainless steel train on short runs, especially the saving in weight, lowered operating cost and improved acceleration. Such results would have been impossible had not the designer had some such metal at his command.

Now that the first white metal trains have proved their worth in their specific field, many more units are being built and cars for combined subway and elevated service are already in operation.

One of my clients, the Pennsylvania Railroad, has at present under construction a series of giant electric locomotives totaling 57 in number. The first of these streamlined engines broke the speed record last February between Washington and Philadelphia, with M. W. Clement of the Pennsylvania and Secretary of the Interior Harold L. Ickes on board. Through the effective use of nickel, steel, iron and copper it was possible to design these powerful engines so as to combine the maximum safety and efficiency in operation with attractive appearance. Nickel in the amount of approximately 350 lb. is used in the alloy steel axles in each of these electric locomotives, and in the cab nickel plating is used on the controllers.

Among the best-known white metals there is a subtle but real variation in color. Monel metal is silver, but with an undertone of blue. Nickel has a yellowish tone under its silver. Stainless steel is blue-gray. For the most effective use of these modern metals the designer must know and make use of these variations in color.

The adaptability of modern metals was strikingly set forth in a recent exhibition of contemporary industrial art at the Metropolitan Museum. In several of the rooms shown there bands of bright metal were the only decoration on the furniture. The entire exhibition was noteworthy in the trend toward simplicity and utility. For the designer's studio I planned I chose the severest of lines and depended on the materials and design for attractiveness. The office of the industrial designer should be adapted to its function. It is really a clinic—a place where products are examined, studied and diagnosed. Refrigerators, oil burners and radi-

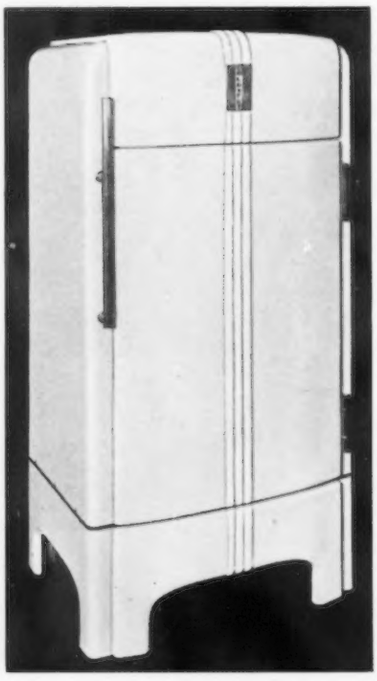


THE first of 57 streamlined locomotives of the Pennsylvania Railroad broke the speed record between Washington and Philadelphia. Through the effective use of nickel, steel, iron and copper it was possible to design these powerful engines so as to combine the maximum safety and efficiency in operation with attractive appearance.

ators are sent by manufacturers—they are pulled apart, a diagnosis is made and the product is redesigned. There must be a designer's office, large surfaces easily kept clean, and plenty of closet and storage space. In this exhibit room the walls were of a light-colored washable plastic, the floor of cadet-blue linoleum and the metal furniture designed along straightforward modern lines. A new metal finish was used, black nickel. It was used as a moulding around the large horizontal window, for the lamps and hardware and for the chairs and drafting stool. Its deep gunmetal tone contrasted with the bright, shiny surfaces of the walls and upholstery. Around two walls are built-in cabinets of formica, the same ivory tone as the walls. In the ceiling are placed four control lens units from which the light rays are bent to reflect from the wall at an angle so there will be no glare.

Household furnishings and decoration offer a wide field for the stainless metals, especially in the department of food preparation and service. The growing emphasis on the kitchen has encouraged designers to make it a place which is both efficient and attractive. Through the liberal use of silvery metal working surfaces, especially monel metal, the modern kitchen has been made bright and cheerful. All types of equipment from sinks to ranges and utensils are available in this stain-resisting metal. Even the smallest room can be so equipped and arranged that it will provide plenty of metal working surface, adequate storage space and efficient arrangement of utensils.

Outside the home, on the exterior of buildings, the stainless metals have proved themselves invaluable for decorative purposes. In almost any town you can see on the shop windows strips of gleaming metal. On the façade of the Waldorf-Astoria Hotel, New York, a very pleasing effect is obtained by contrasting white metal with golden-toned nickel silver. In our larger cities where space is at such a premium the strong rustless metals have been true friends to the designer who seeks to combine efficiency with beauty.



THIS 1935 Coldspot refrigerator is not only beautiful from a contour standpoint, but also embodies a design which will definitely appeal to prospective customers. This refrigerator was developed in record-breaking time, and Mr. Loewy was able to accomplish this by means of his method of working in clay. The "feather touch" at the upper left of the cabinet swings open the door at the lightest touch.

Recently I was called upon to design a new type of filling station for the Standard Oil Company of New Jersey. These stations, the first two of which have now been built, employ a new patented principle—the turntable. The motorist drives into the station and onto the turntable, which revolves at a slow speed around the pumps, and his car is completely serviced with gasoline, oil, water and air in less than two minutes. There is no backing or maneuvering to get to the pump, and the motorist is at all times protected from the weather. Two of these units are at present in operation in New York and other units will shortly be built throughout the country. These buildings, of structural steel, have fronts of porcelained steel, and stainless steel has been used as interior trim.

New metals are constantly being added to the list offered the designer. Modifications of the better-known alloys possessing highly specialized characteristics, as well as new alloys, take their place in the array of materials. New finishes sometimes give old friends an entirely different aspect and widen their fields of application. In the realm of purely decorative metals the development of palladium leaf now provides a material with the color and nontarnishability of platinum. Such are the strides of modern metallurgy that the designer need not hesitate to express his ideas in metals, for he can be confident that just the right one is waiting for his use.

The Use of Metals in Automotive Transportation*

By J. M. WATSON

Metallurgist, Hupp Motor Car Corpn., Detroit

WHEN the use of metals in the automotive industry is considered, it is of interest to go back some years and see what has been done to make the car of 1935 the sturdy, comfortable, long-lived piece of machinery that it is.

The automobile is basically the same now as it was in 1910. The power to drive is generated by a motor, driven by successive explosions of gasoline, and this power is passed into a set of gears called the transmission; true, there were not as many variations of speed in 1910 as now but the basic principle was the same. The power was then passed on to a revolving piece of tubing by means of universal joints and finally reached the rear axle, where it was taken up by gears called the differential, and these caused shafts to rotate and these in turn made the rear wheels go round; because of friction between the tires and the ground the entire mechanism was pushed forward. The car was stopped by means of brakes, the motor was cooled by means of water circulation, the passengers were carried in bodies, and the car was kept in its path by means of a steering gear.

If the 1935 models are analyzed, they will be found to have exactly the same units which perform the same functions as in the older car —and that leads directly to the question as to what has made the difference in appearance and performance possible. The answer, of course, is metals. Who has made the difference possible? The credit must be given to the metallurgists for their increasing knowledge of metals, their properties, alloys and treatments; to the steel companies for their willingness to spend very large sums of money for research work, improved methods of melting, rolling and fabrication; and to the engineers of the automotive companies for their continued improvement in design and their cooperative spirit. However, the latter would have been seriously handicapped had not the metallurgists, by their intensive study and experimentation, produced the steel necessary to give satisfactory performance.

It is interesting to analyze a motor car and see what metals are playing such an important part in our business and social life.

For several years the cylinder block of an automobile was made of cylinder iron, which was composed of pig iron and steel scrap melted in a cupola and poured into a mold. Because of the difficulty of melting and pouring the iron, the cylinder proper and the crankcase were separate units. Also, the walls of the parts were thick because the iron was not strong enough to withstand the strains and stresses to which they were subjected. Cylinder walls were often ¼ in. to ⅜ in. thick, because the iron was porous and the gases of combustion escaped. About 1920 the first real improvement took place, namely, the addition of nickel and chromium to the iron by means of a natural ore containing these elements. Since that time there has been a gradual and steady improvement in cast iron founding until, at the present time, practically every car built has some type of alloy iron in its motor block. A recent survey shows the following types of iron being used:

(1) 0.35 per cent chromium and

* Paper presented before the A.S.M., at New York, May 24.

0.20 nickel; (2) 0.50 chromium and 0.75 nickel; (3) 0.50 chromium and 1.0 nickel; (4) 0.35 chromium; (5) 0.15 chromium and 0.10 molybdenum; (6) 0.35 chromium and 0.20 molybdenum; (7) chromium copper; and (8) 8 per cent Mayari iron.

Experimental work has also been done with irons containing titanium.

High Speed Demands Alloys

Three large manufacturers of motor cars have adopted alloy iron for their 1935 product so that, irrespective of price, the buyer of a 1935 automobile is assured of good material in this important unit.

The ordinary cast iron of 1910 had a tensile strength of perhaps 22,000 lb. per sq. in., a transverse strength of 1400 lb. and a Brinell of 140 to 160. The alloy cylinder iron of today has a tensile as high as 45,000 lb. per sq. in., a transverse strength of 3300 lb. and a Brinell hardness of 217 to 243. Also, the iron is readily machinable.

The use of high-strength iron has been made necessary by the increase of speed and power developed by the motors. Motors are now tested at a speed of 4500 r.p.m., developing 125 or more horsepower. Top road speed is reached with about 4000 r.p.m. This means that the piston of a motor with a 4½-in. stroke is traveling at a rate of 3600 ft. per min. Imagine, if you can, the rubbing friction that is developed between the pistons and cylinder walls, the impact beneath the inlet and exhaust valves and the temperatures reached and maintained in the combustion chambers. The sections necessary for adequate cooling and high strength required to take care of expansion and contraction in these sections are now taken care of by the use of alloy irons.

Metallurgically speaking, alloys when used in cast iron have the following general characteristics: They increase hardness by breaking the graphite up into smaller particles and changing the form from large flakes into more of a rosette form. Thus a closer-grained iron is secured which gives a better wearing surface. Practically all cylinder block castings are annealed to relieve any strains set up when poured in order to give a uniform hardness and improved machineability. This annealing

takes place at such a temperature that none of the desirable properties are sacrificed.

The crankshaft of a motor is the heaviest single piece in the car, weighing nearly a hundred pounds. There has not been much change in analysis of the steel used over a period of several years, but with the improvement in melting practice resulting in controlled grain size, the physical properties have been raised considerably. The forging of this piece is extremely difficult, as the requirements for balance and straightness are very rigid. The addition of counterweights has added considerably to the forging troubles but is the major improvement, resulting in a smooth motor with vibration reduced to a minimum. It might be interesting to know that motor car manufacturers balance the crankshaft statically and dynamically, balance the flywheel the same way, and then balance the combined units. Recently the hardness of crankshafts has been raised considerably due to the use of copper-lead, nickel-cadmium, or silver-cadmium bearings. The lower hardness crankshafts seemed to have a wiping action on the nonferrous bearings. It is not uncommon now to machine cranks with a Brinell of 275.

A very radical change has taken place in the camshafts of cars within the last four or five years. This part was made from a drop forging, usually of 1020 steel which was machined, carburized, hardened and then ground. This was an expensive process and the loss was high due to soft spots, breakage in straightening and decarburization. Many companies are now using a casting for this unit with success. The casting is usually of an alloy with an analysis approximately as follows:

Total carbon 3.15 per cent approximately, 0.55 to 1.00 per cent of combined carbon, 0.50 to 0.65 of manganese, 0.20 maximum of phosphorus, 0.10 maximum of sulphur, 2.20 to 2.35 of silicon, 0.40 to 0.50 of nickel, 0.80 to 1.00 of chromium, and 0.40 to 0.50 of molybdenum.

There are several advantages in the use of a casting instead of a forging. The pattern equipment costs much less than a complete set of forging and trimming dies—some places claim as much as 50 per cent to 60 per cent. Changes can be made at less cost and in much less time, and another saving is effected because no heat-treating equipment is needed. The unchilled portions of the shaft have a Brinell of about 300 and the chilled sections are 75 Scleroscope. The yield point and tensile strength of the materials are, of course, very close to each other, being about 50,000 lb. per sq. in.

The valves are units which have undergone several changes in the past few years. The change has not been so great in the case of the intake valve as its duties are easy to perform; that is, it allows the air-gas mixture to enter the combustion chamber, the temperatures are normal and there is no erosive action. Hence an ordinary chrome-nickel alloy steel is used with complete satisfaction.

Two Types of Valve Alloys

The conditions under which the exhaust valve works are entirely different, for it must allow the hot gases to escape and pass into the exhaust manifold. However, the gases are being forced out at comparatively high pressures and at high temperatures. Under ordinary driving conditions, the exhaust valve temperature will reach a maximum of 1200 deg. F. to 1300 deg. F., but under extreme conditions, such as sustained high speeds with full load, it is possible to reach a temperature of 1500 deg. F. to 1600 deg. F. This, of course, requires a special heat-resisting and erosion-resisting steel. A few years ago, chilled cast iron was used, but as the requirements became more severe a better material was needed. The silicon-chromium steels were used for several years with general satisfaction, but once again speeds and loads were stepped up and the steel makers came to the rescue with the austenitic steels. This type of material is excellent for the head of the valve, as it is not attacked by the hot gases and has

a scaling temperature in excess of that met with in operation. A serious difficulty very shortly developed with this steel, however, as it would not respond to heat treatment and harden. This hardening is necessary at the end of the stem. As a result, the valves as now made have the head made of austenitic steel and the stem of chrome-nickel steel with the two parts welded together. The welding was at first a serious problem and many of the earlier two-piece valves broke at this point.

Two of the prominent types of steel used for the head analyze as follows: 0.50 to 0.60 per cent of carbon, 0.30 to 0.70 of manganese, 0.030 maximum of phosphorus, 0.030 maximum of sulphur, 15 to 16 per cent of chromium, 2.75 to 3.75 of silicon, 14 to 15 of nickel, and 2 to 3 of tungsten. The second type contains 0.15 to 0.30 per cent carbon, 0.50 to 0.80 manganese, 0.90 to 1.20 silicon, 20 to 22 chromium, 10 to 12 nickel.

Closely allied with the development of the valve has been the introduction of the valve seat insert. This has followed closely the increases in speed and compression, although it has not been universally adopted. For the most part these inserts are castings of some type containing a large percentage of alloy. For instance, one that has been used with considerable success contains approximately 4 per cent molybdenum, 3 of chromium, 2 of carbon, 1.25 of silicon and 0.75 of manganese. Others are made of materials of the Stellite type and some are of the high-speed steel analyses. These inserts are assembled into the cylinder block by pre-shrinking in dry ice.

Invar Piston Strut Used

The piston is another part where metallurgy has greatly increased the efficiency. There are two types of material, cast iron and aluminum, and both have made great advances due to increased foundry knowledge. The piston of 1910 had very heavy sections, depending on mass strength to prevent breakage. It was heavy, weighing 2 lb. or more, and it was difficult to keep the weight uniform. With increased foundry knowledge, pistons having a higher strength, better wearing surfaces and weighing only a little over a pound are standard in all cars. The above refers to cast iron material, but the same holds true of those made

of aluminum. In the early days of aluminum pistons, the differences in hardness and expansion of the aluminum and cast iron presented very serious difficulties. The use of aluminum pistons resulted in noisy motors due to piston slap when the motor was cold, oil pumping due to the excessive clearance between piston and cylinder walls, and scored pistons due to the difference in hardness. These difficulties have gradually been overcome, and with the addition of alloys the expansion has approached that of cast iron. The inclusion of an invar strut has also accomplished the same end.

The most recent development in cast iron piston manufacture is tin-plating. A coating of tin is electroplated on the piston and acts as a soft bearing metal when the motor is being run in. Companies using this type of piston claim that they can install them with smaller clearance and obtain better motor performance; also, it is not necessary to "baby" the motor during the early use of the car.

This covers the changes and developments of the ferrous metals in the power plant. Considerable improvement has been made in the use of non-ferrous metals, the most conspicuous of which has been in the bearings. Up to two or three years ago all the crankshaft bearings were made of a phosphorus bronze back lined with babbitt; the connecting-rod bearings were either of the same composition or were babbitt, centrifugally cast or spun into the rod and held by a bond of pure tin. Both gave satisfactory results. If, however, a connecting-rod bearing burned out due to lack of proper lubrication or improper bonding, it was necessary to change the whole unit. This procedure would quite often throw the motor out of balance due to the difference in weight of the old and new rods.

There are three new types of bearings now being used, all steel-backed; first, a copper-lead bearing; second, a cadmium-nickel and, third, a cadmium-silver-copper bearing. All three types are light in weight and are easily replaceable. Now if a bearing burns out or fails, a new one is put in its place in the same connecting rod. It is much less expensive, faster, and does not alter the weight of the unit. There has been some trouble with these bearings when certain types of lubricating oils have been used. Where organic acids are blended into the oil the load is affected, and on high-speed dynamometer tests the failure has been quite rapid. As stated in the discussion of crankshafts, the alloy bearings work much better with a steel hardness of approximately 275 Brinell.

The unit next to be considered is the transmission. The 1910 transmission gears were large in diameter and the faces of the teeth were wide—resulting in a very heavy unit. The first steel was straight carbon, case hardened. Tooth breakage due to shock was common and the results were generally unsatisfactory. With the advent of alloy steel, engineers changed the materials rapidly, and the first extensive use of alloy steel was in the gears, both in the transmission and the rear axle.

Transmissions Are Stronger and Lighter

The treatment of alloy steel gears has had quite a cycle. At first they were case-hardened and were mostly nickel steel. The high-carbon-chrome or chrome-vanadium steel came next, and at first these were given a straight quenching treatment. However, as tooth pressures became higher and the size of gears became smaller, the gears were given the so-called cyanide-dip treatment. In this process the gears are heated in a heat-treating furnace until they have become uniformly heated, then immediately transferred to a cyanide pot at the same temperature, held for about five minutes and then quenched, the object being to give a thin skin hardness to the wearing surfaces.

The next step was to go to a fully-cyanided gear, using an alloy steel of about 0.48 to 0.52 carbon.

A hardness of 52 Rockwell C was obtained. Nickel-molybdenum steel was added to the others and has given very satisfactory results. The last year has seen a tendency to go back to the case-hardened gear. The transmission of today, in spite of the increased speed and power of the cars, weighs about 65 per cent to 70 per cent of the older type, and the overall length is not over 75 per cent as great. This is due to the development of high-strength steels, controlled grain size and improvement in heat-treating processes.

In order to get good machineability, it is necessary to normalize and anneal gear forgings to a Brinell of 187 to 207. This is done in a continuous furnace; the first third of travel is at 1725 to 1775 deg. F., then the gears pass into a cooling chamber, where their temperature drops to 1325 to 1375 deg. F. The last half of the travel is at this temperature, and the resulting structure is mostly lamellar pearlite. Continuous cyanide furnaces, accurately controlling the heating time, have been developed and, more recently, gas carburizing furnaces with controlled atmosphere have come into use.

In the transmission, and the rear axle as well, automotive engineers have been striving for lighter and smaller units to take care of more power and speed, and up to the present time the metallurgists and steel mills have been able to meet the challenge.

Axle Shafts Changed

The chief improvement in the universal joint and propeller shaft has been the introduction of the so-called needle bearings. These bearings are made up of 120 to 150 pieces of hardened steel wire about 1/32 to 3/64 in. in diameter. They are made from a bearing steel and hardened. This bearing has made it possible to make a smaller end to the shaft, which is very desirable, for with smaller wheels and a lower center of gravity every ¼ in. of space that can be saved is welcome. The quality of tubing in this unit has been vastly improved, especially as concerns the stiffness. Rotating speeds of 4000 r.p.m. are common without the development of any whip or run-out, and thus a much smoother car operation is secured.

There has been very little change in the basic principle of rear axles over a long period, and it has been the ingenuity of the designing engineers that has made more efficient driving units. The form of the differential driving gears has changed considerably. First was the straight tooth, then the spiral and now the hypoid. Each of these types was able to carry increasing loads without increasing the size of the gear and, in fact, with the controlled steels as now manufactured the ring gears of 10-in. diameter are doing the work of gears of 12 in. in diameter. This helps to lower the center of gravity of the car and give safer car performance, a thing that is always paramount in the minds of automotive engineers.

The design of axle shafts, the method of manufacture and the material used have changed considerably since the higher tensile steels have been developed. This part used to be a straight bar of uniform diameter and was heavy. When heat treated the axle warped and twisted, and unless it was carefully straightened it would whip. The design was such that the stresses were not uniform and fatigue failures were not uncommon. Now the shafts are usually formed either by rolling in dies or forging, and engineers have taken advantage of this improvement and can make a shaft that has a high factor of safety throughout. The different types of alloy steels, chrome-nickel, chrome-molybdenum and manganese are used with very satisfactory results, and here again the improved methods of steel making have made it possible to carry heavier loads without increasing the size of the shaft.

The tendency to use better alloy steels has been very strong in the parts of the car that have to do with the safety of the driver; for example, the steering gear, the front axle, the steering knuckle, the steering arm and the pivot pin that holds the steering knuckle in place in the front axle. More attention is paid to design, material, heat treatment and inspection of these parts than any other unit of the car. Only the finest grades of steel can be used here, and to get maximum results only the most careful heat treatment can be used.

The radiator of a car uses a large amount of non-ferrous material, mostly thin brass sheet and solder or copper tubing and solder. This has been universal practice for many years from a material standpoint. Corrosion troubles, due to electrolysis, have been common, but can be done away with through care in washing out of the soldering flux and the use of inhibitors in the cooling medium.

The leaf springs on the automobile of today are basically the same as in 1910, consisting of a main leaf with the eyes rolled at the ends and the remainder of the spring made of flat plates which are fitted together and held by a center bolt. However, the material has been changed and so improved that the passengers ride in comfort today. For many years the springs were made of carbon steel, and it must be confessed that they were crudely and poorly treated. The composite spring then came into use, with an alloy main leaf and the remaining leaves made of carbon steel. With the adoption of a full alloy spring, heat-treating methods were developed so that one may ride in comfort without fear of being let down by a broken leaf spring. The use of coil springs in the front end of the car (so-called "knee action") has only become possible because of the use of alloys and the improvement in the manufacture of the bars from which the springs are coiled.

High Bearing Limits Required

Some of the highest precision work in an automobile is in the ball and roller bearings, and here again the trend has been toward the best steels obtainable. One large ball bearing company started an intensive research on bearing steels about seven years ago and it is not entirely completed yet. This company has worked on at least 25 different analyses of steels, having made thousands of bearings of each type. This, of course, is extremely costly, but the company feels that it must be done in order to maintain a satisfactory product.

A roller bearing company has recently built a separate building for their final assembly and inspection, and it is interesting to know that it is completely air-conditioned, the temperature being controlled within 3 deg. This is considered necessary, as the limits of a bearing are so close that a few degrees difference in temperature will cause noise to develop.

So far, only the chassis of an automobile has been considered, but the largest tonnage of steel is used in the body and fenders. Compare the size sheet that was

S. E. HACKETT, President, Jones & Laughlin Steel Corp.
Drawn by John Frew for The Iron Age

necessary to make body stampings of the old touring car with one now necessary to make the modern sedan body. These sheets must be uniform as regards hardness and finish over their entire surface and must take the most severe bends without failure. The division between strip and sheets used to be clearly defined, but the widest strip steel of today has passed the sheet limit of a few years ago. Recently one of the trade papers announced the installation of a 42-in. strip mill. However, a few years ago 48 in. was the maximum width obtainable in sheets. Now sheets 74 in. by 144 in. are used, and one company would like to obtain sheets 83 in. by 155 in. for their bodies next year. These developments have been made possible by the cooperation of sheet steel manufacturers and the improvement in stamping dies. When it is considered that a complete set of fender and body dies costs approximately $750,000, it can be readily seen that in order to pay for themselves they must turn out a very large number of stampings. This output has been accomplished by the use of high-grade alloy irons. The pressures developed on some of the presses are very high, and without the use of alloys the complicated stampings would not be possible.

The so-called decorative parts of a car, i.e., the body hardware, trim panels, radiator grill and running-board moldings, have all seen a great change. Zinc or aluminum die castings, brass forgings, stainless steel stampings, have almost entirely replaced the nickel-plated steel parts for the above units. The radiator grill of most cars is composed of many small bars. These used to be made of several small pieces of steel welded together, nickel and chrome plated. Now it is a single die casting, chrome plated. Two-ply steel, that is a thin sheet of stainless over carbon steel, is being developed for running-board moldings and, in general, parts which have an eye appeal are being made from nonferrous material so finished that the appearance of the car does not deteriorate from corrosion or rusting.

This forging in brief covers the metals used in a modern automobile. The elements which are used are as follows:

Aluminum is used for pistons, castings and body hardware; antimony is used in babbitt; cadmium in bearings and for plating; carbon in the steels; chromium in the steels and for plating; copper for the bearings, plating and gasoline lines; iron for castings and in the steels; lead in the terne-plate and for bearings; magnesium in castings; manganese in the steels; molybdenum in the steels; nickel in the steels, cast iron and for plating; phosphorus in the steels and for castings; silicon in the steels and for castings; silver in bearings; sulphur in the steels and cast irons; tin for plating and in bearings; titanium in castings; tungsten in the ignition; vanadium in the steels, and zinc for die castings. And if there is included those metals used in the fabrication of parts—such as tool steels, etc.—the list would be lengthened considerably.

The first standardization of automotive steels was undertaken about 1909 by the Association of Licensed Automobile Manufacturers; in 1911 this work was undertaken by the Iron and Steel Division of the Society of Automotive Engineers, and its first report, published that year, covered seven carbon and 11 alloy steels. Compare that with the 1935 report, just released by this same division, which shows 26 carbon steels, 9 free-cutting steels, 5 manganese steels, 10 nickel steels, 22 nickel-chromium steels, 12 molybdenum steels, 4 chromium steels, 9 chromium-vanadium steels, 3 tungsten steels, 2 silicon-manganese steels and 7 heat and corrosion-resisting steels, a total of 109.

A list of steels such as the above is a burden to steel manfacturers, and at the present time many of the automotive companies are trying to reduce the number of types and analyses of steels used. This is greatly to their advantage, as it tends to more economical purchasing and makes the heat-treating departments easier to handle.

In this connection, the writer believes that the steel companies could be of greater service to their customers and also to themselves if they would do more intensive metallurgical sales promotion work among the engineers, and this work should be done by what might be termed practical metallurgists rather than men of the research type.

Many of the steels listed above may be considered as interchangeable as far as physical properties and adaptability are concerned. Many times the choice is left to the designer of the part, who may have a leaning toward one type of alloy, while another designer working alongside of him may be more familiar with a different type; the result is a multiplicity of different analyses of steel. The chief engineers are so busy with the mechanical developments, new designs, patents and machine tool improvements that they do not have time to study and digest all the literature concerning steels. Metallurgical men of the type just referred to could give them information about newly developed steels, their properties and uses, in a condensed form. This should lead to closer cooperation between engineers and steel companies and work out to the mutual benefit of both.

Let's see what the automobile means to the steel companies. In 1922 the automotive industry used 8.98 per cent of the steel made. In 1934 it used 20.87 per cent, and was the largest single user of steel. This amounted to 3,775,833 gross tons of finished steel; of this amount, 925,438 gross tons were in bar form, 1,057,713 tons were sheets, 1,050,650 tons were strip, 78,505 tons were tubing and 122,590 tons were wire products. These figures show what a very large outlet the automotive industry is for all types of steel, especially the sheet and strip divisions. Last year 2,778,739 cars were produced, and up to the first of May of this year about 1,500,000 cars have been produced and the companies are still busy, so we of the automotive industry feel that we are doing a great deal to aid in bringing back better times.

Now consider the alloy steel; the automotive industry used 64.86 per cent of hot-rolled bars, 48.08 of cold-drawn bars, 4.27 of sheets, 3.80 of plates, 49.44 of hot-rolled strip, 14.15 of cold-rolled strip and 45.81 of tool steels. This total amounts to 53.31 per cent of the alloy steel made.

These figures bear out what I have endeavored to show in my analysis of metals in automotive transportation, namely, that this has become not only a steel and alloy age but an alloy steel and alloy age, and that it has been the mutual cooperation of engineer, metallurgist and steel maker that has made these remarkable developments possible.

Improvements in Production

Planetary-Type Gear Lapping Machine For Small Fine-Pitch Gears

FELLOWS GEAR SHAPER CO., Springfield, Vt., has placed on the market a planetary-type gear lapping machine particularly adapted to the lapping of small, fine-pitch gears. On this machine the lap, which is of the internal gear type, is held stationary in the machine. Attached to the work-spindle of the machine is a self-contained, planetary-type head carrying three supplementary work-spindles, in which arbors are retained for holding the work.

The planetary head is rotated by the main work-spindle and, as it rotates, carries three work-holding spindles with it. Each spindle has a pinion attached to it, and these mesh with individual internal gears, which are arranged to offer resistance to the free rotation of the work. In this way, sufficient pressure is exerted to expedite the

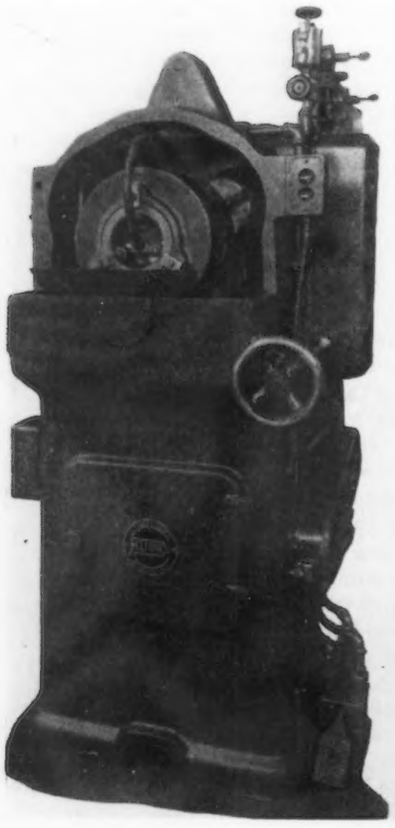


FIG. 1

EIGHTEEN small, fine-pitch gears are lapped in 30 sec. by the method covered in the design of this equipment. The planetary head is rotated by a main work spindle.

THE three supplementary work spindles, shown below, carry six gears each for the lapping process. Work-loaded arbors are brought directly from machines which perform the previous operation.

FIG. 3

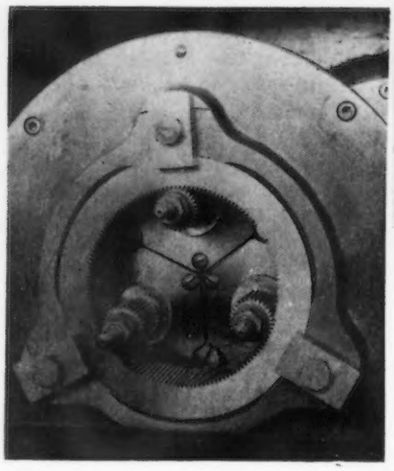


FIG. 2

A RECIPROCATING action accomplishes the lapping operation while a rotating motion distributes the lapping compound. Upon completion of work, foot treadle movement effects air-ejection of arbors.

and Shop Equipment . . .

lapping operation. The planetary head, in addition to being rotated, is reciprocated; the rotative motion distributes the lapping compound, and the reciprocating action accomplishes the lapping.

The machine can be supplied in several different arrangements to suit the character and shape of the work. The design shown in Figs. 1 and 2 is for lapping small gears which are .75 module, 30 teeth, 0.235 inch face-width. The three work arbors each carry six gears. These gears are heat treated before cutting and are brought directly from the gear shaper to the lapping machine without removing them from the arbors. The actual lapping time does not exceed ½ min. for 18 gears.

To facilitate operation, an air ejector for the work arbors is provided. The air cylinder is attached to the rear of the machine workspindle, as shown in Fig. 3, and is operated by the foot treadle shown in Fig. 1. Gears of different diameters are lapped by using internal-gear laps made to suit the diameter of the gears and the center distance of the three lap spindles. This method can be adapted to the lapping of both spur and helical external gears.

Small Nibbling Machine

A SMALL power nibbler for templates and line cutting, having capacity of ⅛ in. in mild steel and 1/16 in. in alloy steels, is announced by W. J. Savage Co., Knoxville, Tenn.

A patented tool holder assembly is employed. Adjustable tools and dies, revolving head, adjustable ram bushing are among the specified details. Throat depth 9 in. Feeds 36 to 60 in. per min.

The machine is bench model, weighs 125 lb. and is direct driven by a ¼-hp. motor.

High-Speed Notching Press Has Eccentric Throw

HIGH-SPEED notching presses, equipped with rotary friction-driven index attachment, are used for notching motor laminations at a rate of 400 to 650 notches per minute. Such equipment is illustrated below. V. & O. Press Co., Hudson, N. Y., is the maker.

The design is pedestal type. The journal bearings are of overhanging construction, carrying the thrust directly into the body proper. The shaft has an eccentric throw, affording rigidity and a large bearing surface. Main bearings are all alloy-bronze bushed.

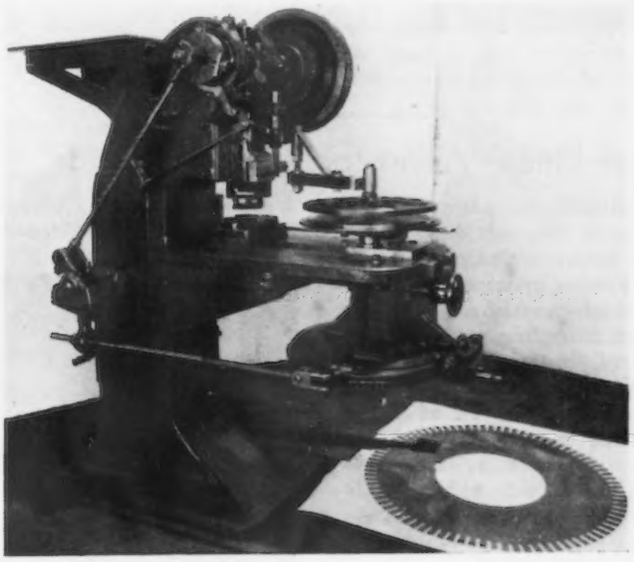
A multiple disk friction clutch is employed for the elimination of shock at high-speed engagement; the brake is engaged only when the clutch is released. The flywheel, of web type, is balanced and is well lubricated for high-speed operation.

A double-length slide runs in ways of equal length, cut in the solid body casting. Adjustment is made by a single loose gib and one set of adjusting screws. These features secure precision of slide travel and accuracy of punch and die registration. Simplicity features the punch and die employed for notching.

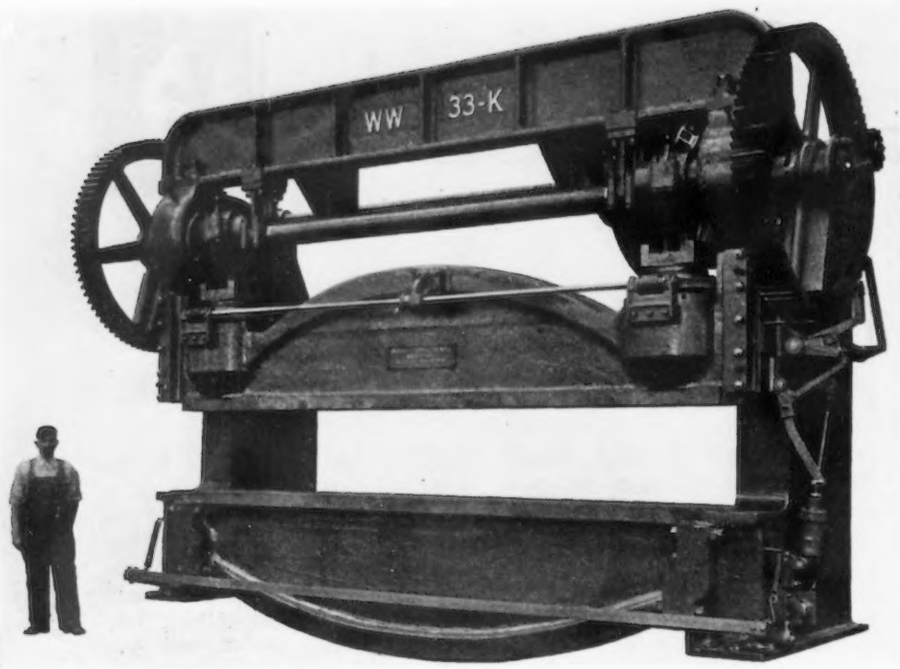
The disks are rotated by a friction-driven index attachment, so constructed that there is no strain on the spindle carrying the disk-holding chuck. The index rings are of large diameter, for assuring accurate registration.

The index pawl is confined in an adjustable housing and is so arranged that there is no wear on the notches or teeth of the index-ring. This tends to the accurate spacing of the disk notches.

The range of laminations is from 3 in. to 30 in. in diameter.



THE design of this high-speed notching press provides solid-cut ways for slide of double length. Accuracy of registration and precision of all movements are stressed by the maker.



Multiple Punch Design Permits Varied Use

THE single back-geared, twin drive, multiple punch shown above, is built by Williams, White & Co., Moline, Ill. The press capacity is 250 tons. The principal dimensions are: Stroke of slide 5 in., adjustment of die space 8 in., die space, stroke down adjustment up, 22 in., distance between housings 176 in., length of ram 184 in., width of table face 20 in., depth of throat 11 in., strokes per min. 25, weight 92,000 lb.

The machine is equipped with a multiple grip friction clutch, engaged by air operated foot treadle, and is provided with automatic stop at top of stroke. A hand engagement of the clutch is also provided for die setting or for lowering the ram slowly to the work.

Barrel type of adjustment is used. The adjusting screws are not subjected to any other strain than compression at any part of the stroke. The adjustment of the ram is motor driven and of self-locking type.

With the slide elevated to its uppermost position, the machine will accommodate maximum clearance braking dies that make possible operations common to the press brake. With the slide lowered to its lowest position, the machine will accommodate punching and shearing dies without the use of filler bolsters.

Rubber-Lined Valves for Corrosive Fluids

A RUBBER-LINED valve of simple, rugged design and suitable for use with corrosive and abrasive fluids under conditions of fairly high pressure, pulsating pressure, throttling or suction, is announced by the B. F. Goodrich Co., Akron, Ohio. An illustration of the valve is given at right. The lining may be any of the standard Goodrich acidseal compounds, hard or soft, as best suited to conditions of service. Valve action does not depend upon a flexible diaphragm. A resilient, rounded disk, which snaps over a circular plate at the lower end of stem, provides a seal when brought into contact with the molded rubber-covered seat-rings. Both disk and seat-rings are simple in design. It is said that the valves, designated as "Vulcalock," can be used without hesitancy for vacuum and throttling work. A nearly straight line of flow admits of fairly high-pressure work and abrasive service. On sizes up to and including 6 in., there is no restriction of flow through the seat-ring.

The seat-ring is a molded member and is removed by taking off body bolts. This ring is double-seated and reversible. Reversal of the lower body section provides change from a straightway valve service to angle valve service. The acidseal lining is bonded to the metal parts by patented Goodrich process. Corrosive or abrasive materials come in contact only with rubber, especially designed to resist their deteriorating action.

Timken Sheave Bearing Installations

TO simplify the machining problems developed by the increasing use of manganese steel in crane and hoist sheaves, the Timken Roller Bearing Co. has developed a new type of bearing mounting using double-cup bearings. This type of mounting permits the sheave hub to be bored straight through at a single setting.

In one design, the bearing cup is pressed into the hub and located by means of end caps. Shim adjustment is provided. In another, the cup is located by means of snap rings. In a third, the location of the cup depends upon its press fit in the hub. These basic designs can be modified to combine the desired bearing mounting with the type of side-frame construction used.

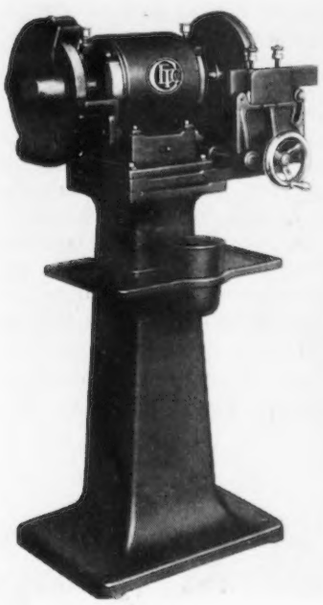
Stub-Wheel Grinder

RANSOM GRINDING MACHINE CO., Oshkosh, Wis., announces a new model grinding machine designed for using up stub wheels of 7-in. diameter reduced from 12 to 14 in. original wheels.

S.K.F. ball bearings, lubricated with filtered oil are employed. Distance between wheels is 42 in. Standard arbor is 1½ in. in diameter. The weight is 650 lb. Equipment includes push-button starter. Three-hp. motor at 3600 r.p.m. is used.

Combination Cut-off And Grinding Machine

CINCINNATI ELECTRICAL TOOL CO., Cincinnati, has announced a combination cut-off machine and grinder. The machine, constituting a small unit suitable for tool room cutting and grinding and also for cutting and grinding specimens for microphotography in research laboratories, is illustrated at left.



A 10-in. by 1/16-in. abrasive cut-off wheel is carried on the right-hand side and operates at a peripheral speed of approximately 9000 surface ft. per min. The material to be cut is fed into the wheel by means of a hand screw. The stock is held firmly on both sides of the cut, preventing wheel breakage. Fully inclosed wheel guard affords protection to the operator. The vise or holding fixture may be tilted to give any angle desired up to 15 deg. The machine will cut stock up to 1 in. in about 15 sec.

The left-hand side of the machine is equipped with an 8 by 1-in. grinding wheel with fully inclosed safety wheel guard, adjustable to the wear of the wheel and with exhaust connection. An adjustable tool rest is mounted on the wheel guard.

The motor is 1 hp. fully inclosed with the rotor shaft mounted on oversize ball bearings in dust-proof housings. A two-pole starting switch is inclosed in the base of the motor.

Floor or Bench type is available.

Small Arc Welder for Thin Materials

A NEW motor generator type arc welding machine is announced by the Lincoln Electric Co., Cleveland. Illustration is at the left. Special adaptability is claimed for automobile repair shops, sheet metal and fabricating shops and others called upon to weld thin gage materials.

Designated as the SA-100, the new unit delivers as low as 30 amp. at the arc without use of auxiliary devices. The machine is motor driven and has a current range of 30 to 125 amp. The generator is of single-operator variable-voltage type with 100-amp. NEMA rating. Patented dual control, with independent adjustment of open circuit voltage and welding current, is provided.

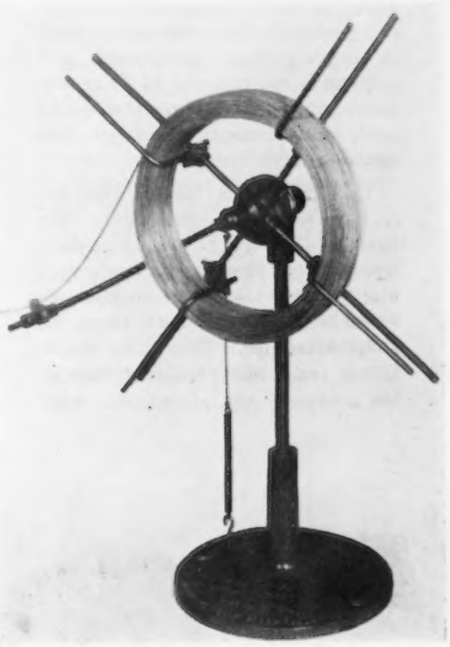
The motor supplied is "Linc-Weld," 5-hp. squirrel-cage induction type, for across the line starting. The starter switch is push-button type. The new welder is normally 220 or 440 volts and can be furnished for 110 or 550 volts, 3 or 2 phase, 60 and 50 cycles as desired. Connections are readily available for reconnecting from 220 to 440 volts, or vice versa.

The machine is 20 in. long, 16 in. wide, 40 in. high and requires less than 2¼ sq. ft. of floor space.

Stock Reel Operation By Automatic Brake

F. J. LITTELL MACHINE CO., Chicago, has placed on the market the No. 0 reel illustrated below, for holding coils of stock weighing up to 100 lb.

The reel is mounted on needle bearings. The automatic brake prevents the stock from unwinding too rapidly. When the stock is pulled forward, the roller rises, releasing the automatic brake and permitting the stock to be pulled without resistance from the reel. When sufficient stock has been unwound, the spring shown pulls the roller down and operates the brake. Fitted with arms, the reel will handle coils 9 in. I.D., 32 in. O.D. and 3½ in. wide. When fitted with plates, coils 1¾ in. I.D., 32 in. O.D. and 3½ in. wide can be handled.



REEL for carrying 100-lb. coils. Release of automatic brake permits of uncoiling without reel resistance.

A new type of automatic flat coil feeder for use with standard presses is also announced by this company.

Unit Trend Calls for Harmonized A

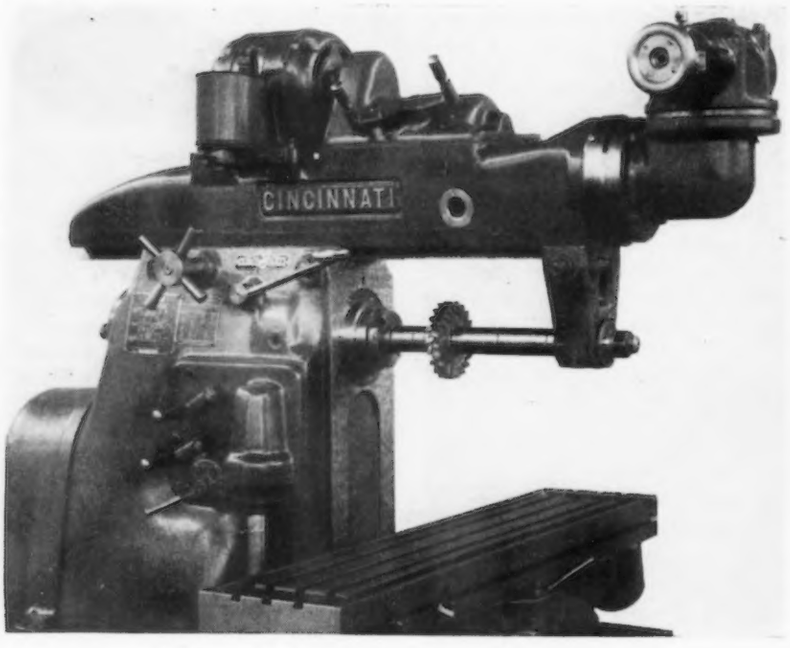
CONTINUOUS and interesting development of unit-member features, in various types of metal working machines, impressively illustrates the marked design-tendency to provide required capacity in flexible availability without necessity for large investment in single-purpose equipment, and without a multiplicity of accessory parts; these advantages combining with reduced requirement for floor space.

This trend has necessitated design-consideration, not only for each unit-member, but for each whole, consisting of the basic unit and the individual unit-member, as assembled for different types of shop schedules. The units themselves (each one), must not resemble accessory equipment, but must serve to complete a harmonized construction.

The attainment of these ends is illustrated in a number of recent production presentations in THE IRON AGE; a further illustration is here given, using the development of a motor driven universal milling attachment by the Cincinnati Milling Machine & Cincinnati Grinders, Inc., as the example.

Fig. 1 illustrates the attachment built into the machine overarm and replacing the standard overarm, common to the milling machines manufactured by the company. Attachment to the arm is provided in a manner which in no wise interferes with the normal use of the overarm and arbor supports, as the spindle carrier can be easily swiveled out of the way, as illustrated by Fig. 2. This Cincinnati application of unit trend permits, for example, that a shaft job with a slot and a flat, milled at right angles, plus or minus 0.001 in. in squareness, can be handled at one setting with only one loading of the fixture. Similarly, in die making, jig and fixture work, metal patterns, etc., cuts can be combined and set-ups eliminated as compared with operating possibilities on the millers not equipped with the attachment.

Flexibility of the unit can be increased by the addition of an aux-



THE unit in no wise interferes with normal use of the overarm and arbor supports, as the spindle carrier is easily swiveled out of the way.

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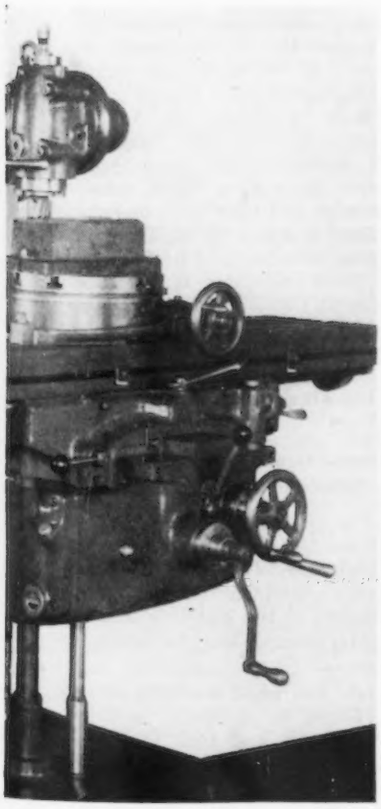
A NEW motor driven un'versal mill Cincinnati knee and column type a self-contained unit

Assemblies of Component Members

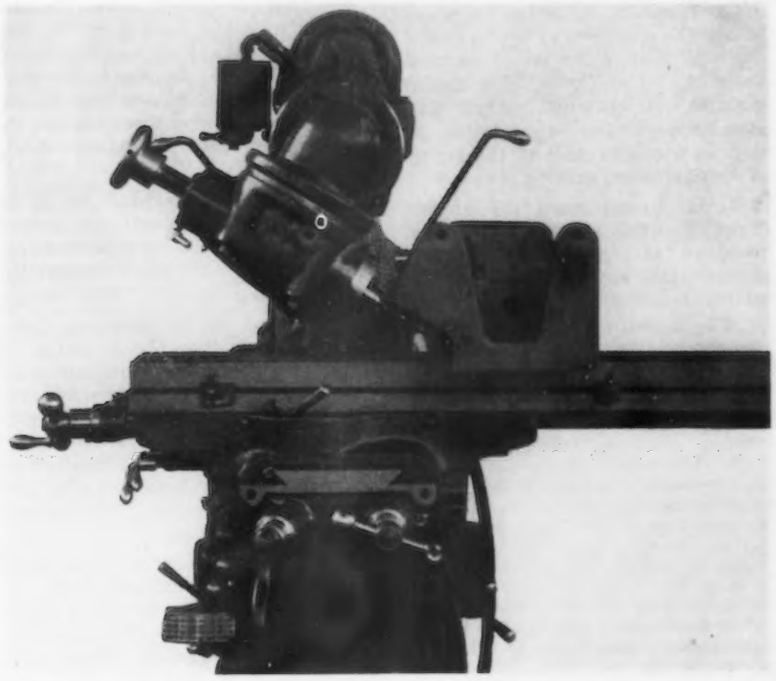
iliary hand-feed quill device, shown in Fig. 3. This provides that holes, not exceeding 3 in. in depth, can be drilled and bored at angles. This auxiliary device consists of a sleeve which fits into the straight hole in the attachment spindle; it is supported at the outer end by a bushing fitting the taper hole of the spindle. Rotation is prevented by a key between the bush and the sleeve. A draw-in bolt seats the taper shank tool. Specifications covering the unit attachment are as follows:

A constant speed 1-hp. motor is mounted on top of the overarm, and connected to the speed box by means of a flexible coupling. Nine changes of speed, ranging from 100 to 1030 r.p.m., are obtained through sliding gears. Speed changes are made from the left-hand side of the column through the use of two gear shift levers. All shafts and gears are made of heat-treated alloy steel with the exception of two bronze bevel gears which drive the spindle. Automatic lubrication and visible oil gage are employed in the speed change unit. Cutters are interchangeable for use in the spindle nose of the attachment and the spindle of the miller on which the attachment is used; both are made with 5 1/16 in. O.D. and taper hole 3½ in. taper per ft. The attachment spindle and the shaft in the swiveling units are mounted on anti-friction bearings. One direction of spindle rotation is standard, but a switch can be supplied for reversing the rotation of the motor and spindle.

Bowdil Co. has acquired a part of the Canton, Ohio, plant of the Dayton Malleable Iron Co., and will shortly be located in its new quarters, which provide 20,000 sq. ft. of floor space. Some new equipment will be installed. The company manufactures chains, bits and other appliances used in the coal mining industry. Charles L. Bowman is president and general manager, Wendell Herbruck is vice-president and H. M. Dawson is secretary-treasurer.



ing attachment as it is assembled on milling machines. The assembly provides built into the overarm.



AN auxiliary quill device with hand feed adds to flexibility and is convenient in drilling and boring angular holes not exceeding 3-in. in depth.

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NEWS OF THE WEEK

Steel Industry Pledges to Maintain Code Standards

MORE than 200 executives of the iron and steel industry from all parts of the country, representing over 90 per cent of the total capacity of the industry, meeting at the American Iron and Steel Institute, New York, June 6, pledged themselves to maintain present rates of pay and maximum hours of labor and standards of fair competition as described in the steel code.

The steel leaders also pledged themselves to continue to protect employees' rights of collective bargaining.

The meeting was called by the directors of the American Iron and Steel Institute in order to place before the members of the industry the resolution of the board adopted June 3, which called for maintenance of present wages and standards of fair competition as well as for protection of the rights of collective bargaining.

E. G. Grace, president of the American Iron and Steel Institute, presided at the meeting which unanimously ratified the resolution of the board of directors of June 3. The action of the meeting was summarized by the following resolution:

Resolved, that the members of the iron and steel industry in general meeting assembled this sixth day of June, 1935, hereby unanimously ratify the resolution of the board of directors of American Iron and Steel Institute, adopted June 3, 1935, and each of us hereby declares that the company which he represents is in favor of supporting the position taken by such resolution and that it is the intention of such company, acting individually and voluntarily, in so far as it may do so, during the present uncertainty to maintain the present rates of pay and maximum hours of labor and the standards of fair competition which are described in the steel code, and that such company will continue to protect the employees' rights of collective bargaining.

In addressing the steel executives, Mr. Grace expressed the situation confronting the steel industry as a result of the Supreme Court decision on the NRA and the invalidation of the codes. He made a plea for the maintenance of present wage rates and the standards of fair competition in the industry, declaring that the wiping out of the codes had placed a new and great responsibility upon leaders in the industry.

"The industry has three great obligations: first, to preserve fair treatment for labor, second, to deal fairly with the buying public, and third, to exercise an intelligent trusteeship of the funds invested in the industry. I put the obligation to labor first, because the industry's great obligation starts with labor."

Mr. Grace declared it would be suicide for the industry to do any chiseling with the commitments entered into with labor under the steel code.

"Nothing in the Supreme Court decision requires the industry to change its practices of fair competition which have been adhered to under the steel code. Nothing in the court decision requires the industry to go back to chiseling of wages, secret rebates, or any discriminatory methods of competition."

Mr. Grace pointed out that under employee representation plans, various companies in the steel industry, for many years, had collective bargaining plans in effect. The steel industry, he said, was one of the first to start the share-the-work plan and it has always stood for the open shop, a position which has been staunchly supported by employees themselves.

Referring to the steel code, Mr. Grace declared that the steel industry had developed universal compliance with the provisions of the code, the operation of which had been beneficial in many respects to the industry, and small companies particularly had benefited from the operations of the steel code.

"In the operation of the steel code," Mr. Grace said, "the industry has had the finest kind of relationships with the Government."

Addresses were made by various other steel executives, including W. A. Irvin, president of the United States Steel Corpn.; W. J. Filbert, chairman, finance committee, of the United States Steel Corpn.; E. T. Weir, chairman of the National Steel Corpn.; S. E. Hackett, president of Jones & Laughlin Steel Corpn.; Hugh Morrow, president of Sloss-Sheffield Steel & Iron Co.; T. M. Girdler, chairman and president of Republic Steel Corpn.; W. S. Tower, executive secretary, American Iron and Steel Institute; W. H. Davey, president, Canton Tin Plate Corpn.; and Thomas R. Akin, president, Laclede Steel Co. All urged that the industry stand united in maintaining standards of fair competition.

President Grace Answers Questions at Subsequent Conference with the Press

IN a conference with the press, in which Mr. Grace read a prepared statement embodying the consensus of the institute meeting, he interpolated the following remark:

"You see, what we were after—The board of directors met here last Monday and took the action which we gave you, and we thought at that time it would be advisable to bring all the industry in here and put it directly before them whether they as individuals representing the interests in this indus-

try were willing to subscribe to the recommendations set forth in that resolution."

He went on reading. When finished, he said:

"All of the 200 people I have told you were at the meeting, every man there voted on that resolution unanimously. There wasn't even a criticism of it. It was very spontaneous."

Questions by the press followed.

Question. How many others talked at the meeting besides yourself?

Answer. Oh, a number just got up and made extemporaneous remarks, but they are all consolidated and set forth here in what I voice as the conditions that confront us.

Question. What machinery will be set up by the institute to carry out the provisions of this resolution?

Answer. The institute proposes to continue as a part of its activities all the committees, consolidating them where they were specifically code committees, as many of them existed simply because of our code authority operation. Those committees will be set up as committees of the institute.

Question. What facilities will the institute have for handling labor disputes?

Answer. The American Iron and Steel Institute doesn't handle labor disputes of the industry. The relationships between employees and employers are individual to each company.

Question. There were provisions under the code for handling labor disputes, were there not?

Answer. No. There was a labor committee which will be continued, but it had no power to deal with questions of relationships between employers and employees. The labor committee saw to it that they obtained observance of the code. We'll have our commercial committee, our statistical committee, our technical committee, our labor committee. We will continue the reporting of all the statistics we now make substantially the same, but as time goes on the form of the reports may change a little, but we expect to continue the reporting of that kind of information into the American Iron and Steel Institute so that we may find it available.

Question. What are you going to do about the personnel of the institute?

Answer. I assume that there will be a gradual cutting down of some of the personnel and activities of the institute. We had quite an enforcement organization required under the code. Of course, there is no legal power now of that character.

Question. Under the code, as I recall it, each company was required to file prices on its products. Will that be continued?

Answer. The prices, prior to this code decision, have all been filed by code members covering the third quarter business. Therefore, that question is not a live one at this moment. What the future will hold in store as to what can be appropriate activities of the American Iron and Steel Institute as to its members, along those lines, only the future can tell.

Question. When you read your statement, among other things, you said that the institute would protect the rights of the industry's employees on collective bargaining.

Answer. The members are individually and voluntarily responsible for their respective companies. I am assuming that we will all keep in effect our present employee representation plans. If you were asking me that for Bethlehem, that's what I would say. We had collective bargaining long before the NRA came along. Then the NRA came along and took a leaf out of our book. We had it long before and the fellows who didn't before have had it substantially since.

Question. I just wanted to know if you made any change. You are going to protect the rights of collective bargaining as you did as a code authority?

Answer. Bear in mind that our code didn't give any power as code authority to deal with relations between employer and employees of the individual companies. The code authority didn't administer that. I am satisfied that collective bargaining requirements through which employee representation plans operate will be carried on by the individual companies. I think many other members of the industry think the same way.

Question. Mr. Grace, just how much of the old code will be retained?

Answer. There isn't any code.

Question. You have retained the code in principle, haven't you?

Answer. My statement sets out that there was no reason why we shouldn't maintain the present wage standards and principles of fair practice. There are no codes. Whatever is done by any industry, I assume must be based upon voluntary action by an individual company. The individual companies making up the steel industry have subscribed to these principles.

Question. To put it in another way, then, we understand that the code is out and that the industry is split up into individual units and that each one has the right to say what he thought at this meeting, but in a general way this resolution says that they are going to maintain about the same practices in all respects excepting that they didn't discuss whether they were going to file prices because they are already filed for the third quarter and in all other features there is a virtual pledge that they will continue what they have done before.

Answer. The individual representatives of each company have said they will do just what I have written here for you. That is what they have expressed their intention of doing.

Question. Was there any discussion today of the Sherman Act in view of the invalidation of the NRA?

Answer. Not at all. We called them here to see, what, as individuals, not having a steel code, they thought was an appropriate policy for them to adopt at this particular time in lieu of the steel code which has gone out the window. Now they said, this is what we, as individuals representing individual companies, should do and are going to do.

Question. Was any company of any importance not represented at the meeting?

Answer. No. You can see the records. More than 200 were present, representing over 90 per cent of the producing capacity.

Question. Did the meeting express any sentiment about the Schechter case decision?

Answer. No. It wasn't discussed at all. We discussed where this industry now is as a result of the decision of the Supreme Court invalidating the code system under which we have been operating and you'll find it all spelled out in full.

Question. In view of the fact that individual companies have voluntarily agreed to sustain wage levels, what do you think would be the outlook for prices?

Answer. Personally, I should expect to see and certainly hope to see them continue substantially at present levels. I see no occasion for changing them at this moment, either up or down, and certainly the industry can't afford, with its costs and the low volume of business, to have less revenue from the business it is doing. And we propose to maintain our present wage rate, which is a controlling factor in our costs. It seeme to me that the buying public, as well as we as producers, would find it most inadvisable to start chiseling any place here, either at one end of this business or at the other.

Question. I assume a copy of this resolution will be sent to Washington.

Answer. I can see no need for that. It seems to me that you boys will send it to Washington.

Question. Have you seen any evidences of price-cutting?

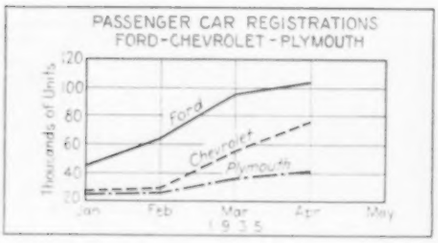
Answer. Not one, thank God! Not one. We believe sincerely in the maintenance of our present labor situation. If you start with that, you can see where you are.

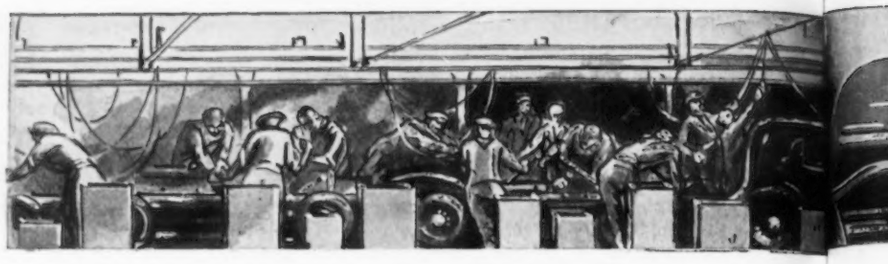
A.S.T.E. Plans Trip to Machine Tool Show

THE American Society of Tool Engineers, with headquarters in Detroit, has announced that it will hold its September meeting in Cleveland in connection with the Machine Tool Show. The society has chartered the steamer "Greater Detroit" for a special excursion to Cleveland, leaving Detroit the evening of Sept. 12. The following day will be spent at the machine tool show in Cleveland, and that night the society will stage a dinner meeting, returning to Detroit by boat after the session.

Ford Building for Soy Bean Conversion

FORD MOTOR CO., Dearborn, Mich., has plans for new one-story addition, 75 x 150 ft., to be equipped as a soy bean conversion plant to cost close to $75,000 with machinery. Giffels & Vallet, Inc., Marquette Building, Detroit, is engineer. Company will carry out the expansion in power division at Canadian branch plant at East Windsor, Ont., operated in name of Ford Motor Co. of Canada, Ltd., including installation of three new steam turbo-generators, 20,000, 5000 and 750 kw. capacity respectively; two new high-pressure boiler units, stokers, pumping machinery and auxiliary equipment. Cost about $1,500,000. Work is expected to be completed early in 1936.





THIS WEEK ON THE

Automotive Production Declining As End of Model Run Approaches

DETROIT, June 11.

AUTOMOBILE production is coasting downhill toward the end of the run on 1935 cars. The descent, however, is not so speedy as to be alarming. It won't be long, possibly Aug. 15, before the bottom is reached. About Sept. 1, car manufacturers will begin to trudge back up the production hill.

Deflation of automotive activities is evident on all sides. Steel buying for current models, with the possible exception of Chevrolet, is over. Several companies, including Ford, are having mills hold up shipments of material already rolled and probably will not give releases until after June 15. Parts makers have pared operations sharply. Briggs, for example, has cut deeply its schedules on Ford bodies.

The industrial employment index of the local Board of Commerce has declined from 110 to 103, and for the first time since last Dec. 5 the Wayne County welfare load has turned upward. More than 28,000 families have been removed from the rolls since that date.

This is not to be interpreted as a cry of "wolf." It is merely a statement of the condition of the industry today, which is a natural development of the plan to announce new models in the fall rather than at the year-end. In fact, Detroit is not downhearted. It is planning to take a vacation a little ahead of the usual time and, in turn, buckle down to work again earlier than usual in the late summer.

June promises total assemblies of 350,000 cars, with a possibility that the final figure may be as high as 375,000. General Motors is counted on for 153,000 cars and trucks, of which Chevrolet will build 115,000. Ford, drawing in its lines here and there, is understood to have curtailed its program this month, and it now appears doubtful whether its assemblies will number 120,000 units. Output of Chrysler divisions likewise is reported slipping.

It is too early to venture an opinion regarding July volume. Manufacturers will be governed next month by the course of retail sales from week to week and by the condition of field stocks of both new and used cars. Dealers of at least two large companies have exceedingly large stocks on hand which they will have to work off in the next month or two. Beginning this month it is logical to expect that production generally will lag behind retail sales.

Most companies will clean up present runs early in August and start operations on 1936 models about Sept. 1. Oldsmobile, for example, is asking for prices on certain parts and is requesting that the first batch for the new cars be delivered at its Lansing factory by Aug. 15. This presages the beginning of work on 1936 Oldsmobiles around Sept. 1.

Steel mills are anticipating little new tonnage until August, when moderate-sized orders should be placed. Some mills still are shipping against old orders allotted to them as long as six weeks ago by Ford. Practically all important motor car companies have comfortable stocks of steel piled up in their plants, the volume being enough to last them at least through July.

As the end of the first half draws near, where does the industry stand? In the five months from January to May inclusive it assembled 1,988,637 units, or 28,968 more units than in the same period of 1930. This compares with 1,475,965 units during the same five months of last year. In April it built 501,837 units, a record surpassed in only six individual months in its history, from March through August of 1929.

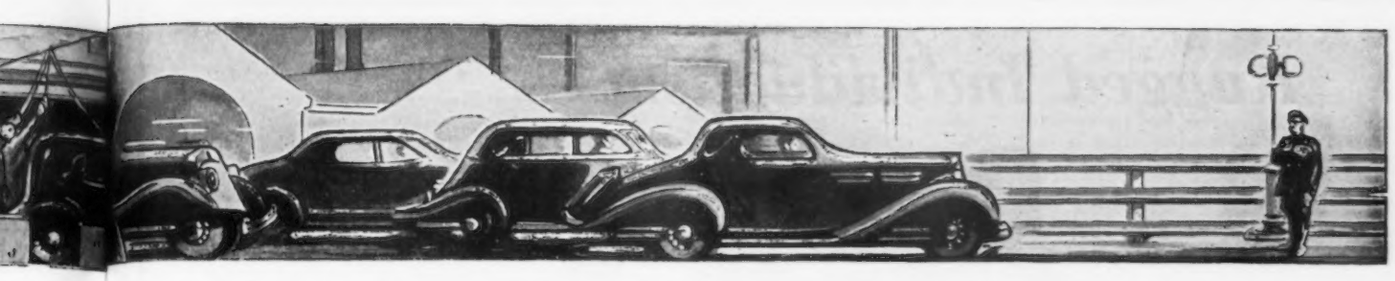
Domestic passenger car registrations from Jan. 1 to May 31 of the last six years were as follows:

1935.....	1,163,379
1934.....	771,691
1933.....	508,177
1932.....	514,873
1931.....	975,209
1930.....	1,392,658

Truck registrations in the United States in that period were:

1935.....	202,852
1934.....	159,976
1933.....	69,576
1932.....	82,688
1931.....	148,834
1930.....	194,630

Perhaps indicative of unduly large stocks of new cars in dealers'



ASSEMBLY LINE

BY BURNHAM FINNEY

Detroit Editor, The Iron Age

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hands is the fact that in the first five months of this year production ran 28,968 units ahead of that in the comparable months of 1930 (the year which 1935 is closely paralleling), yet sales of passenger cars and trucks during those months of 1930 were 221,057 units ahead of those this year.

Three companies report an absence of large field stocks. Chevrolet is still trying to catch up after costly production delays. On June 1, Hudson-Terraplane's stocks totaled 14,063 cars, whereas a year previous they were 23,792 cars. Packard, behind in filling orders for its One Twenty, claims a shortage of 3000 cars in the field.

Farmers Buying Cars

What of the summer? Sales executives, just back from swings around the country, are exuding optimism, basing most of their hopes on the improved economic status of the farmer. Chevrolet points out that Federal aid is helping the farmer improve his house and buildings, higher produce prices are leaving him something over and above his actual living expenses for investments in commodities which he needs, and the supplemental income derived from Government sources is enabling him to buy farm implements, passenger cars and trucks. Chevrolet adds that "the outlook for business from farmers would be good even without the addition of the Government benefit money." Chevrolet's expectation of sustained summer business also takes into account the stimulus felt by cities from improved farm conditions.

Retail sales, of course, will drop off somewhat as seasonal influences are felt. May, for instance, was lower than April in volume of retail deliveries and June will be less than May. The only uncertain factor is how much of a drawback fall announcements of new cars will be to sales in August and September. Concerted drives will begin in July to liquidate present stocks. This year they will not be hampered by red tape in the retail code which existed a year ago. One might add that car manufacturers will not have to resort this year to the subterfuges of last year to make legal a reduction in list prices.

The silly season of wild rumors about next year's cars has arrived, but after most of these reports are thoroughly sifted, there is nothing left. The idea that something radical in design is being planned for 1936 is not correct. Anything which is likely to take the public along faster in changes than it wants to go seems doomed to grow dusty on the experimental shelves for another year.

Automatic Transmission Studied

Nothing so important as the turret top has been in 1935 looms among 1936 possibilities, unless it be the automatic transmission. It is known that Dodge is seriously studying a new transmission on which it has been working for several years, but no decision is believed to have been made regarding its use next year. At least one company is reported considering the adoption of the so-called Electric Hand which Hudson-Terraplane has popularized. It is a patented device of the Bendix people at South Bend. Location of the motor in the rear appears to be a year or two off on any production car.

Some publicity plugging is being done on behalf of the rotary valve engine as against the poppet valve type. Joseph A. Anglada, consulting engineer, declares that the assembly cost of an engine can be cut 25 per cent by eliminating the poppet valve mechanism. The use of the rotary valve action would make engines quieter and more powerful for their size. The rotary valve requires virtually no adjustment at any time.

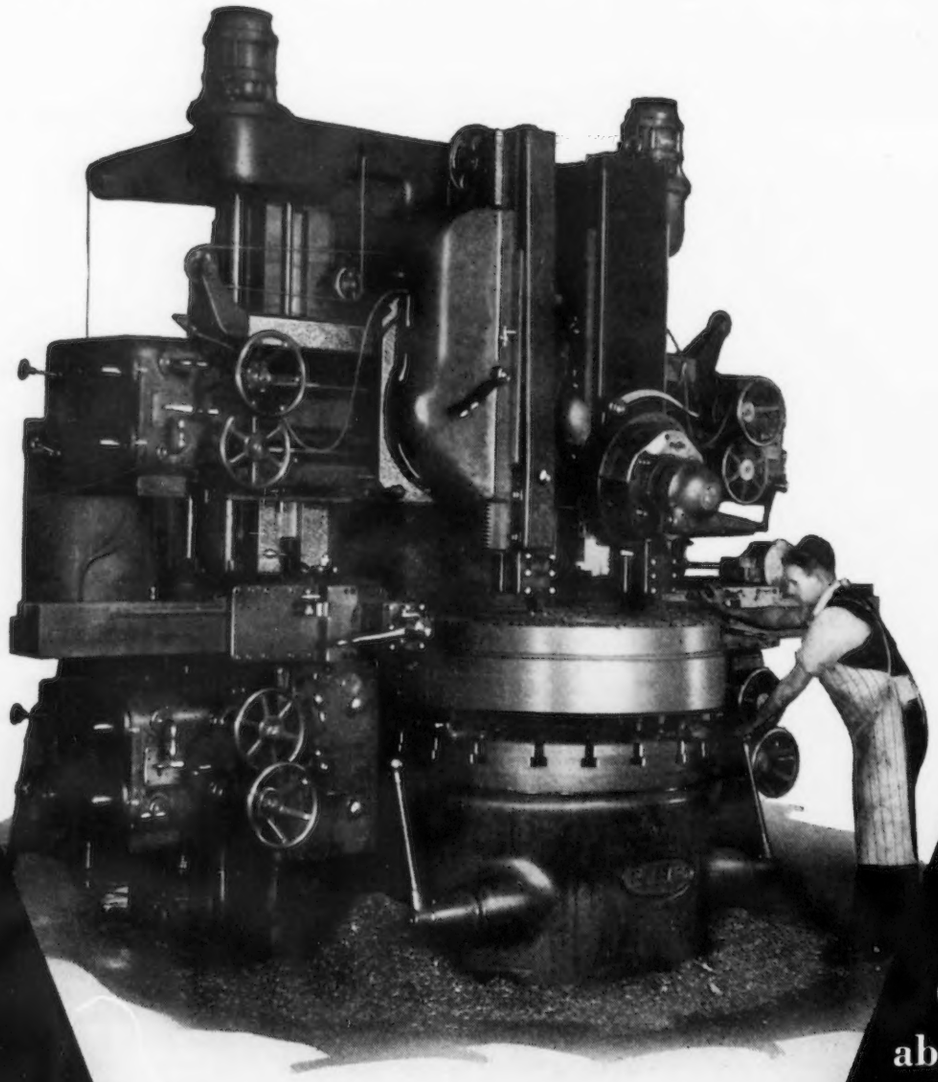
Chrysler divisions and some General Motors divisions have been taking bids on tool and die work for 1936 models. It is understood that the Chrysler orders are likely to be placed in shops in the Detroit-Toledo district rather than farther afield.

Detroit Notes

Murray is making some frames for Chrysler as well as for Ford at its Ecorse plant. . . . Packard shipped 5614 cars from its local factory during May and hopes to build 6000 this month. It has orders for 7006 cars. From Jan. 1 to May 31 its dealers sold 12,106 cars, compared with 2295 in the same period a year ago. . . . Cadillac-LaSalle sales in May were 40 per cent higher than in the same month of last year and the largest since April, 1931. . . . Pontiac built 19,406 cars in May for the best single month's total since June of 1929. It has made 89,964 cars this year, or 20 per cent more than in all of 1934.

Ford made retail deliveries of over half a million cars in the January-May period. . . . M. Mathis, French automobile manufacturer, whose interests are now united with those of Ford in France, and Maurice Dollfus, managing director of Matford S. A. F. (the Mathis-Ford combination), were visitors at Dearborn the past week. . . . The millionth Pontiac will come off the assembly line at

Rugged Individualism—



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Vertical Turret Lathes

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46 inch - - - 56 inch
66 inch - 76 inch
86 inch

Obtainable in—Two, Three or Four Head Combinations. Four Head Concentration Affords a High Degree of Cost Reduction

BULLARD

Bridgeport Connecticut

Pontiac on Wednesday. The event will be the signal for a great civic celebration. . . . All work on Pontiac axles is to be transferred next year from the Chevrolet gear and axle plant in Detroit to the Pontiac factory at Pontiac. . . . Significant of better times is the fact that 75 per cent of Packard's retail sales have been for cash. . . . Nash is continuing production at a good rate to stock dealers with its "400" car.

C. R. Hook Honored By Michigan College

THE honorory degree of Doctor of Mining Engineering was conferred on Charles R. Hook, president of The American Rolling Mill Co. by the Michigan College of Mining and Technology, at Houghton, Mich., June 6, for his contribution to the development of the iron and steel industry.

After graduating from high school, Mr. Hook became an apprentice roll turner in the steel mills. He joined the American Rolling Mill organization 32 years ago as night superintendent, and in 1904 introduced what is believed to be the first of the modern plans of employee representation in American industry. Mr. Hook was a pioneer among business executives to advocate taking the mystery out of business by taking employees into the confidence of the management.

Mr. Hook became president of the company in 1930, after having served successively as department superintendent, assistant general superintendent, general superintendent, operating vice-president and vice-president and general manager.

The continuous method of manufacturing sheets, the greatest single advancement in the rolling of iron and steel sheets, was developed during the time when he was in active charge of operations.

The company which he heads has always been considered outstanding for its excellent relationships with its employees, and Mr. Hook is internationally recognized as an outstanding authority on problems affecting management and men.

Editor's Note: This is a series of observations which, strangely enough, are exactly what they purport to be. In other words, they come from the daily diary of a real boss; a prominent executive in the metal-working industry who prefers to remain an anonymous author.

The Boss's Diary

I get a kick out of the way the old time efficiency expert tries to hide his hand. The other day a chap came to see me on an efficiency program. He spent two thirds of his time assuring me that he wasn't an efficiency man and the other third in trying to sell me an out and out efficiency service. He mustn't have rated my gray hairs very high. I've been dodging those boys for two decades and I can smell 'em a mile off. The trouble with most of them is that they start from the premise that the boys in the shop are a bunch of dumb clucks while I start from the premise that these boys know a heck of a lot more about things than we managers do. If some "expert" would come along with a system that would train management away from our cocksure complacency, that would take the blinders off my eyes and rub the rust off my brains—I might be a customer. But why recommend something that would disturb my self satisfaction—it's so much pleasanter to kid myself that I am good!

Stevens Awards D.E. To Robert C. Stanley

ROBERT C. STANLEY, president of the The International Nickel Co. of Canada, Limited, was awarded the honorary degree of Doctor of Engineering by Stevens Institute of Technology at its 63rd commencement exercises, held in the William Hall Walker Gymnasium building at Castle Point, June 8.

Mr. Stanley is an almnus, having been graduated in 1899 with the degree of Mechanical Engineer. On Dec. 14, 1933, he was elected to serve as a member of the board of trustees.

Following his graduation from Stevens Institute he entered the Columbia School of Mines, from which he received the degree of Mining Engineer in 1901. In the same year he joined the International Nickel Co., with which he has since been continuously associated and of which he became president in 1922. In conferring the honorary degree upon Mr. Stanley, Dr. Harvey Nathaniel Davis, president of Stevens Institute of Technology, read the following citation:

"Mr. Chairman of the Board of Trustees: I present to you Robert Crooks Stanley, Stevens 1899, president of the International Nickel Company, notable for the skill and vision with which he first welded many local constituents into a world-wide industrial unit and then reshaped the metal which they had molded during a great war, taking it from the soldier and domesticating it to the peaceful uses of the housewife, the builder and the designer of a myriad of machines and devices that serve us all. I recommend him for the degree of Doctor of Engineering, *honoris causa*."

Among Mr. Stanley's professional affiliations are memberships in the Canadian Institute of Mining and Metallurgy, the Institute of Metals, London, the American Institute of Mining and Metallurgical Engineers, American Iron and Steel Institute, American Mining Congress and the Mining and Metallurgical Society of America. He also is a member of council of the Princeton University International Summer School of Geology and Natural Resources.

THIS WEEK IN WASHINGTON

Administration taxidermists study the practicability of stuffing and mounting the defunct Blue Eagle.

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Unionists multiply strike threats to stampede favored legislation; shout "chiselers" but fail to name them.

o o o

Richberg praises code adherence of steel industry.

o o o

Long and short haul clause of Interstate Commerce Act aids foreign steel; hurts domestic.

o o o

New FHA $50,000 loan limit will widen modernization market.

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BY L. W. MOFFETT
Resident Washington Editor, The Iron Age

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WASHINGTON, June 11.—Even as the poor old Blue Eagle was receiving its final rites from the House of Representatives last Friday, it was the object of turbulent discussion which was so characteristic of its varied career from fledgling to full-taloned, full-clawed and then poorly respected storm bird. . . . Given a legislative reprieve of nine and one-half months to April 1, 1936, to flutter after being brought dizzily to earth by the Supreme Court, there was a great deal of skepticism in Administration circles that the heritage of voluntary agreements left to the "skeletonized" and "fact-finding" NRA means anything. . . . Failure of the House eight-line resolution to repeal authority for the President to approve wage and hour agreements voluntarily entered into by industry was the source of conflicting views. . . . Democratic members of the sponsoring Ways and Means Committee insisted that the anti-trust laws may be suspended under voluntary trade agreements in the absence of opening the way for monopolistic practices. . . . Opponents of the resolution, rushed through the house by a vote of 264 to 121 after two hours discussion, challenged the view as did several Senators, prepared to make an onslaught on the resolution after being sent to their side of the capitol. . . . And the President himself said that while business may still get together under voluntary agreements authorized in the original recovery act, no anti-trust laws may be suspended under such compacts . . . implying prosecution might be forced by reason of agreements. . . . Organized labor, strutting across its old stage with its actors waving weapons of "economic strength," radios through the voice of President William Green of the American Federation of Labor, opposes the NRA extension measure, offers its own licensing "recovery" substitute and warns of widespread industrial conflict if code standards are lowered. . . . Snorting at the idea that voluntary agreements will be effective, affecting lack of faith in them, organized labor went hell-bent for trouble . . . or perhaps it is nearer the mark to say, its executive council, timing its meeting in Washington to NRA extension legislation, was putting on high-pressure bluff to enforce its inexhaustible supply of "demands" . . . an NRA as it wants it, Supreme Court or no Supreme Court; the Wagner labor disputes bill, the Guffey coal nationalization bill, the 30-hr. work bill and so on endlessly . . . elated over tacit if not outright Presidential approval of an amended Wagner bill and reported but not confirmed approval of the Guffey bill . . . furthering the "campaign of fright," the United Mine Workers say they will go on strike on June 16, effective date of the NRA resolution . . . leaving his once more or less potent position as a member of NRA, Sidney Hillman announces plan for a $1,000,000 defense fund behind "labor's fight" for maintenance of code wages and hours as he resumes leadership of the Amalgamated Clothing Workers of America, each member of the association taxed to the tune of $10 . . . this in face of the fact that from no quarter did NRA in its best days get berated harder than it did from organized labor. . . . it "reports" a breakdown of code wage and hour provisions in virtually every indus-

try throughout the land . . . but can't support its case. . . .

Maintenance of Wages Confounds Unionists

On the contrary, organized labor appears to be disappointed that many major as well as minor industries have announced determination to stick by wage and hour provisions . . . fearing apparently that it is being deprived of a talking point to unionize industry, though ready to make the attempt through the Wagner bill or any other vehicle at its disposal . . . there were no good words from organized labor for the steel industry's unanimously adopted resolution to maintain wages and hours . . . instead a sneer. . . .

In official Administration circles, however, where there was no questioning of the sincerity of voluntary agreements, grave doubt was expressed that either wage and hour provisions or prices could be maintained . . . fear was felt that the "5 to 10 per cent chiseling fringe" would cut under code structures . . . such structures really did exist in some basic industries, and the retiring head of NRA, Donald R. Richberg, also Administration member of the steel code, has repeatedly praised the steel industry for leading in code adherence . . . on the other hand, code structures in some industries were mythical. . . .

Bonus and Profit Sharing Plans Coming Back

Organized labor is not as yet airing the fact but it does not like what appears to be a growing trend of industry to set up profit-sharing or bonus plans for labor . . . it realizes they take away incentive for unionization and despite its pretense that such plans are "camouflage" to "delude" workers, it well knows the system long has been operated by a number of important American concerns . . . and it knows that coming from a high-grade organization like the Sun Oil Co., its monthly bonus of 5 per cent to all employees receiving $2,500 or less per year, effective June 1, will be an example for other industries. . . . The Sun Oil Co. likewise sounded a note that is assuring when it stated, "We feel that the workers of the country have nothing to fear and everything to gain as the result of the Supreme Court's decision declaring the NRA dead, and that the country can now go ahead to a great and permanent prosperity." . . . Consumers from whom the greatest degree of hostility to NRA emerged, will agree with the Sun Oil Co.'s observation that "Under the complicated system of codes which has existed for the past two years, production costs have become greater and greater and the purchasing power of our people has become less and less, thus definitely and surely reducing our standards of living" . . . writhe as may those with whom NRA had become a religion, the sentiment expressed is widespread . . . and not only will NRA never again be revived under its old complicated and impossible system of regimentation, but if industry and business now go forward under their own, Congress and other forces permitting, it will become but a memory . . . this despite what are reported to be Administration plans for later enactment which would restore NRA, as nearly full-panoplied as the Supreme Court blasting decision would allow . . . some opponents of NRA suspect that the curtailed NRA extension plan is "Trojan horse" in which are concealed New Deal forces armed with a new and drastic NRA bill.

Some Would Welcome Worse Business

The slant is taken that Administration forces, while obviously wanting to see recovery, would take delight in seeing industry foozle the job of going footloose under its own steam, without bureaucratic control . . . thus furnishing an alibi, ready to be sprung by the "fact-finding" NRA that the Blue Eagle or perhaps a happier symbol must be restored to its high-perch to do its part in planned economics . . . nevertheless, even if the Trojan horse is hidden in the legislative shadows, it is not believed it will stalk forth unless the country reacts more than it has so far against the scrapping of NRA . . . it is claimed Administration forces, who were going to "take the Supreme Court decision to the country," are distinctly disappointed at the reaction . . . that, in fact, the reaction in favor of the Presidentially denominated "horse-and-buggy decision" and of the "outmoded" constitution as some of the bright brain trust legal minds have called it has been so surprisingly strong . . . it is notable that the Administration yielded so quickly to scrapping of NRA but is holding fast for a strong AAA, to be amended to come within the decision, it is hoped, yet to continue the processing tax pap to the farmers . . . the answer is: NRA lacked general acceptance, while AAA, the farmers' Santa Claus, has widespread popularity; AAA's popularity obviously being in the agricultural community, ready to raise Cain if deprived of the gifts it provides.

Credit Extension to Aid Machinery Installations

GOVERNMENT officials look for a stimulus in the purchase and installation of machinery as the result of a $50,000 provision of the amended National Housing Act. It is their view that regulations governing the extension of modernization credit by financial institutions under this provision opens a new market which should be of benefit to practically all industry. This type of credit, being handled separately from other types, is extended for additions, alterations, repairs and improvement for "real property improved by or converted into apartment or multiple family houses, hotels, office, business or other commercial buildings, hospitals, orphanages, colleges, schools, or manufacturing or industrial plants." Purchase and installation of machinery and equipment in the types of property mentioned are eligible for modernization credit under the new regulations provided they are "peculiarly adapted to the business conducted therein or necessary to the operation thereof."

"The amendments to the National Housing Act covering the extension of modernization credit for improvement, conversion or equipment of commercial properties are of direct interest and benefit to everyone producing goods or services requiring buildings or permanent equipment," said Stewart McDonald, acting Federal housing administrator. "They are of particular interest to all those who manufacture or deal in machinery."

Modernization Market Widened

Under the amended act, the modernization market has been increased so as to include practically every user of permanently installed machinery or equipment, as well as every property owner.

All charges, including interest, are to be determined by the financial institution and the applicant

for credit, the rates to be as low as is consistent with the character of business in the particular territory in which the loan is negotiated. Under no circumstances can the interest, together with all other charges combined, exceed the equivalent of $5 discount per $100 original face amount of a one-year note to be paid in equal monthly installments.

Revised regulations have been sent to all the approved banks and other financial institutions, all better housing committees and all the offices of the FHA. Mr. McDonald stated that detailed information may be obtained at any of these places by those who can use modernization credit for improvement or better equipment of their properties.

Long-and-Short-Haul Clause Hurting Steel

INJURY to domestic steel manufacturers and fabricators and advantage to foreign steel makers as the result of the long-and-short-haul clause of the Interstate Commerce act was pointed out by railroad witnesses last week before a House sub-committee in urging passage of the Pettengill bill. The bill would repeal the clause. Despite the fact that the carriers for many years have urged its repeal, doubt exists that the Pettengill bill will be passed.

The clause, briefly, provides for the charging of a greater railroad rate for a shorter haul than a greater haul over the same route.

Joseph G. Kerr, assistant to the vice-president of the Association of American Railroads, said that the inability of the railroads to secure relief from the act has resulted in practical closing of market outlets at Texas gulf ports, and in adjacent territory, to manufacturers and fabricators of iron and steel at such representative interior shipping points as Pueblo, St. Louis, Kansas City, Chicago, Milwaukee, Cleveland, Cincinnati and Pittsburgh. It was stated that foreign producers are thus permitted to enjoy an unnecessary advantage in these particular markets over domestic manufacturers located in the interior of the country.

Railroads are barred under the long-and-short-haul clause, without fourth section relief, from reducing that rate to meet a water rate unless a like reduction were made to intermediate points, thus bringing down the entire rate structure to meet competition of this kind.

Mr. Kerr declared that repeal of the long-and-short-haul clause is necessary to enable the railroads to carry out the recent recommendations of the Interstate Commerce Commission that the whole railroad rate structure be subjected to "the most detailed analysis, for the purpose of discovering where it now impairs or impedes traffic, where reductions can be made which will by their effect upon traffic increase aggregate revenue." This recommendation was made by the Interstate Commerce Commission in connection with a decision in March this year discussing the effects of motor truck competition with the railroads. Complaint was made that the necessary fourth section relief often requires so much time by the Commission that the traffic which carrier would otherwise seek has been moved before relief is granted.

Clause Boosted Southeast Rates

F. H. Law, assistant vice-president of the Illinois Central, declared that in actual practice the long-and-short-haul regulations have resulted in higher rail rates in Louisiana, east of the Mississippi, Mississippi, Tennessee and Kentucky, than would have been required otherwise. He gave examples to show what rates were in the period antedating 1918, which was the period in which the railroads enjoyed relief from the fourth section, and the present rates that conform to the long-and-short-haul rule.

"The rate on iron and steel articles antedating 1918 to Memphis from Pittsburgh was 25.7c. and from Chicago 19c. per 100-lb.," said Mr. Law. "Present rates are from Pittsburgh 56c. and Chicago, 38c. To New Orleans the former rate from Pittsburgh was 30.7c. and from Chicago, 28c. The present rates are 67c. and 55c."

He said that had the general increases resulting from the increased costs of transportation during and following the war only been applied to iron and steel rates, the rates to Memphis would have been—from Pittsburgh, 38.5c. instead of 56c. as at present; from Chicago, 29c. instead of 38c. as at present. To New Orleans, he stated, the rates would be—from Pittsburgh, 46.5c. instead of 67c., and from Chicago, 42c. instead of 55c.

The extent of the diversion of traffic to Panama canal routes from the rail lines reaching terminals on the Pacific coast also was outlined in somewhat elaborate detail by traffic officers of the Santa Fe, Southern and Union Pacific systems.

New Edition of Timken Engineering Journal

THE Timken Roller Bearing Co., Canton, Ohio, is issuing a third edition of its well-known engineering journal. It comprises 260 loose-leaf pages, 8½ x 11 in., bound in stiff covers and having a 22-section tab index, as well as the usual index sheets.

The first four sections, 46 pages, cover the design of Timken bearings with illustrations of the various types, a discussion of how they are rated, factors which apply for speed, life expectancy, engine torque, application, and examples of load calculations and bearings for various applications. Following a tabular section of 50 pages are 100 pages of dimension sheets. Illustrations suitable for tracing are given for all single-row bearings, and each sheet carries a table of ratings for the bearing shown for various speeds.

Complete data are available on Timken shims, locknut and washer assemblies, annular groove closures, tubes, etc., and a special section illustrates methods of mounting, with suggestions as to effective closures. Cup and cone fitting practice is discussed in the last two sections. Lubricant specifications cover a wide range of applications, and data are given on the use of the Timken lubricant tester. More than 50 new standard Timken bearings, a new series of six heavy-duty thrust bearings, eight new cups, two new annular ring closures, and 12 new tubes are listed. Special sections on mine cars, conveyors, shop trucks, cranes, aircraft, machine tools and farm equipment are included in the revised journal.

Steel Imports and Exports Register Slight Gains

Exports of Iron and Steel From the United States

(In Gross Tons)

	April		Four Months Ended April	
	1935	1934	1935	1934
Pig iron	74	310	756	1,148
Ferromanganese	1	6	33	14
Iron and steel scrap	131,731	126,687	691,419	463,008
Tin plate scrap[5]	3,641	....	13,589	....
Waste-waste tin plate[5]	1,839	....	7,614	....
Pig iron, ferroalloys and scrap	*137,286*	*127,003*	*713,411*	*464,170*
Ingots, blooms, billets, sheet bars	8,283	260	24,827	2,160
Skelp	978	1,042	3,512	4,927
Wire rods	1,330	1,795	7,644	11,176
Semi-finished steel	*10,591*	*3,097*	*35,983*	*18,263*
Steel bars	3,927	4,828	17,908	14,613
Alloy steel bars	207	343	868	1,241
Iron bars	90	51	437	246
Plates, iron and steel	3,550	3,734	13,238	11,160
Sheets, galvanized steel	5,442	4,454	24,036	21,271
Sheets, galvanized iron	95	105	513	506
Sheets, black steel	8,471	7,134	34,296	24,988
Sheets, black iron	716	449	1,901	1,097
Hoops, bands, strip steel	3,678	3,109	14,651	10,932
Tin plate and taggers' tin	4,849	11,496	39,186	76,390
Terne plate (including long ternes)[5]	264	....	1,021	....
Structural shapes, plain material	2,723	3,365	9,696	7,291
Structural material, fabricated	2,348	1,348	7,832	6,469
Tanks, steel	258	392	2,137	3,278
Steel rails	1,536	8,448	10,446	35,578
Rail fastenings, switches, spikes, etc.	1,025	870	3,242	9,187
Boiler tubes	1,105	639	3,047	2,062
Casing and oil line pipe	1,743	4,844	13,985	19,838
Pipe, black and galvanized, welded steel	3,027	4,405	14,390	15,875
Pipe, black and galvanized, welded iron	354	111	1,375	578
Plain wire	2,678	2,630	11,260	12,364
Barbed wire and woven wire fencing	3,085	3,184	10,744	12,076
Wire cloth and screening	41	67	312	224
Wire rope	423	339	1,498	963
Wire nails	938	1,461	3,539	4,593
Other nails and tacks	271	507	1,260	1,741
Other wire and manufactures	497	438	1,758	1,549
Bolts, nuts, rivets and washers, except track	566	451	2,243	1,568
Other finished steel	127	89	431	502
Rolled and finished steel	*54,034*	*69,291*	*247,850*	*298,180*
Cast iron pipe and fittings	430	429	4,814	4,475
Malleable iron screwed fittings	301	214	1,058	1,009
Carwheels and axles	1,058	262	10,532	1,265
Iron castings	924	472	3,009	2,806
Steel castings	229	426	944	641
Forgings	483	345	2,047	1,206
Castings and forgings	*3,425*	*2,148*	*22,404*	*11,402*
Total	205,336	201,539	1,019,648	792,015

Imports of Iron and Steel Products Into the United States

(In Gross Tons)

	April		Four Months Ended April	
	1935	1934	1935	1934
Pig iron	8,247	8,253	23,729	51,590
Sponge iron	104	127	412	321
Ferromanganese and spiegeleisen[1]	5,563	2,671	13,742	9,874
Ferrochrome[2]	..	....	1	20
Ferrosilicon[3]	80	55	441	146
Other ferroalloys[4]	....	....	1	..
Scrap	1,259	5,214	8,816	16,773
Pig iron, ferroalloys and scrap	*15,253*	*16,320*	*47,142*	*78,724*
Steel ingots, blooms, etc	348	35	970	335
Wire rods	1,094	1,208	4,702	4,119
Semi-finished steel	*1,442*	*1,243*	*5,672*	*4,454*
Concrete reinforcement bars	117	26	318	327
Hollow steel bars	158	70	313	196
Merchant steel bars	1,407	2,074	6,663	5,392
Iron slabs	....	....	....	1
Iron bars	53	158	269	247
Boiler and other plate	37	....	73	49
Sheets, skelp, and saw plate	785	672	2,074	1,879
Tin plate	37	2	83	7
Structural shapes	2,228	1,821	9,401	6,135
Rails and rail fastenings	459	321	1,080	898
Welded pipe	83	107	379	692
Other pipe	396	375	3,605	1,483
Barbed wire	1,813	855	9,078	3,195
Round iron and steel wire	339	224	1,308	870
Telegraph and telephone wire	3	..	7	2
Flat wire and strip steel	205	131	572	486
Wire rope and strand	189	154	699	532
Other wire	57	61	340	220
Cotton ties[5]	....	....	269	....
Other hoops and bands	1,491	1,423	6,281	4,605
Nails, tacks, and staples	2,211	615	5,509	2,174
Bolts, nuts, and rivets	19	48	105	119
Horse and mule shoes	37	47	257	113
Rolled and finished steel	*12,124*	*9,184*	*48,683*	*29,622*
Malleable iron pipe fittings[5]	....	....	46	....
Cast iron pipe and fittings	....	..	....	3
Castings and forgings	47	115	421	489
Total, gross tons	28,866	26,862	101,964	113,292

[1] Manganese content. [2] Chrome content. [3] Silicon content. [4] Alloy content. [5] New class. No comparable figures for 1934 and previous years.

EXPORTS of iron and steel from the United States in April of this year aggregated 205,336 gross tons. This was a slight increase over the same month of 1934, in which the total was 201,539 gross tons.

Scrap continued to be the chief commodity exported, the total being nearly 132,000 tons. Scrap exports for the first four months of this year have exceeded those of the similar months of 1934 by nearly 50 per cent.

One of the notable features of the month's performance is the large increase in export of billets, blooms, ingots and sheet bars. In April of this year, the total tonnage of these commodities sent abroad was 8283 tons, compared with 260 tons for April, 1934.

Imports of pig iron into the United States in April, 1935, ran practically on the same level as a year ago, although the accumulative total for the first four months of this year was less than half of that of 1934. Total imports of iron and steel products for April were 28,866 tons, approximately 2000 tons more than a year ago.

Sources of American Imports of Iron and Manganese Ores

(In Gross Tons)

	April			
	Iron Ore		Manganese Concentrates, 35 Per Cent or Over	
	1935	1934	1935	1934
Canada	1	....	....	....
Cuba	22,000	....	....	....
Chile	67,025	108,808	....	....
Spain	....	....	....	....
Norway	8,900	....	....	....
Sweden	....	....	....	....
French Africa	....	4,250	....	....
Russia	9,300	8,500	7,259	13,568
India	....	....	....	771
Brazil	....	....	....	4,100
West Africa	....	....	2,219	876
Other countries	5,390*	6,002	959	398
Total	112,616	127,560	10,437	19,713

*5105 from Australia.

United States Imports of Pig Iron by Countries of Origin

(In Gross Tons)

	April		Four Months Ended April	
	1935	1934	1935	1934
United Kingdom	100	....	200	100
British India	1,286	871	5,800	13,115
Germany	....	....	....	....
Netherlands	3,281	6,609	10,040	34,077
Canada	2,330	199	4,735	3,099
France	....	....	50	....
Belgium	50	....	100	50
Norway	1,100	402	1,610	402
Sweden	100	....	340	200
All others	....	172	854	547
Total	8,247	8,253	23,729	51,590

Steel Institute Opposes McReynolds Tin Conservation Bill

IN a letter addressed to Hon. Robert L. Doughton, chairman, Committee on Ways and Means, House of Representatives, Washington, the American Iron and Steel Institute opposes the McReynolds conservation bill which would impose an import duty and/or a processing tax on tin.

The letter reads, in part, as follows:

The tin plate industry is the largest consumer of tin in the United States, using approximately 25,000 gross tons annually of a quality which must analyze over 99.80 per cent pure.

It is the contention of domestic producers of tin plate that:

(a) The smelting of foreign tin ores in the United States has been acknowledged and proved to be uneconomical.

(b) There are no deposits of tin ore in the United States which are of sufficient importance to be worthy of commercial consideration.

(c) The effort to foster and develop a tin smelting industry in the United States is uneconomical and, if it were established, such an industry would not be an effective factor in our national defense for the reason that the United States would still be dependent on foreign countries for a supply of tin ore.

The largest consumption of tin in the United States is in the manufacture of tin plate. The tabulation of figures taken from official sources shows the total deliveries of imported refined tin in the United States for each year, 1905-1934 inclusive, together with the quantity produced from domestic mines, and the tonnage produced by smelters using foreign ores, the latter operating only from 1916 to 1924.

One of the accompanying tabulations shows the apparent consumption of tin for all uses, the amount used by producers of tin plate in each year, 1922 to 1934, and the burden which would be imposed on such consumption by the proposed taxes above mentioned.

It will be observed from the tabulated figures that if the taxes proposed in the McReynolds bill (H.R. 7675) had been in effect during the last 13 years, they would have placed a burden on the American tin plate industry ranging, on the basis of average consumption, from a minimum of $3,306,000 to a maximum of $6,612,000 annually. The aggregate annual burden placed on all American consumers would have amounted to approximately $8,830,000 as an annual minimum or possibly $17,660,000 as the maximum.

That burden of taxation would be forced on American industries which imported for their use 1,613,739 gross tons of refined tin during the 30 years ending Dec. 31, 1934, solely in the interest of a few American smelters which must depend on foreign ores, and in the interest of promoting the development of alleged American tin mines, which, however, do not exist.

Imports of Refined Tin, Domestic Production of Tin Ore, and Output from Smelters Using Foreign Ores in the United States, 1905-1934

Year	American Deliveries Imported Refined Tin, Gross Tons	United States and Alaska Tin Ore Production (Metallic Tin Content), Gross Tons	United States Smelter Output of Tin Produced from Foreign Ores, Gross Tons
1905	38,600	0	....
1906	41,200	42	..
1907	35,000	60	....
1908	33,400	30	....
1909	41,500	20	....
1910	45,350	40	..
1911	44,300	70	..
1912	49,500	130	..
1913	43,900	50	....
1914	41,700	104	....
1915	48,750	102	....
1916	56,216	140	2,018
1917	57,881	110	5,415
1918	58,339	69	9,182
1919	32,301	50	10,925
1920	51,120	20	15,761
1921	25,918	3.6	10,305
1922	57,490	1.2	8,132
1923	70,154	1.7	6,666
1924	64,125	6.3	434
1925	76,455	12.3	....
1926	78,050	7.14	....
1927	72,490	24	....
1928	78,865	42	....
1929	89,110	35	....
1930	78,225	15	..
1931	63,450	3.7	....
1932	36,320	0.4	....
1933	57,815	2.4	....
1934	46,215	(not yet reported)	....
Total	1,613,739	1,192	68,838

Consumption of Tin in the United States, 1922 to 1934, Apparent Total and Total for Tin Plate

Year	Apparent Total Consumption, Gross Tons	Tin for Tin Plate, Gross Tons
1922	57,360	22,100
1923	67,888	24,700
1924	64,255	22,500
1925	75,905	26,000
1926	75,452	27,100
1927	69,412	24,200
1928	78,853	26,600
1929	87,574	28,600
1930	76,621	26,800
1931	63,569	23,300
1932	35,260	16,100
1933	58,793	28,910
1934	43,276	22,668
	854,218	319,578
Average annual consumption	65,700	24,600
Proposed processing tax of 6c. per lb. based on average annual consumption	$8,830,000	$3,306,000
Proposed import duty of 6c. per lb. based on average annual consumption	8,830,000	3,306,000
Total annual cost to American tin consumer (processing tax plus import duty)	$17,660,000	$6,612,000

More Applications Made for Allotments

AMONG applications for allotment funds filed with the Public Works Relief Administration are the following:

War Department (Corps of Engineers): Alhambra, Calif., $1,200,000, for construction of reinforced concrete conduit in Alhambra Wash; $409,000 for construction of reinforced concrete open channels in Rubio Wash.

Compton and Los Angeles, $2,296,000, for construction of reinforced concrete conduit from Compton and Los Angeles to Los Angeles river.

Glendale and Los Angeles, $1,874,000, for construction of concrete channel and an increase in capacity of existing concrete conduit.

Los Angeles, $2,009,000, for construction of permanent improvements along Los Angeles river in form of concrete-lined levels; $3,520,000, for construction of two rock jetties extending into Pacific ocean, a riprap protected channel and multi-barreled reinforced concrete cover section.

Pasadena, $1,481,000, for construction of debris basin and permanent channel; upper two miles of channel to be a trapezoidal concrete-line section and lower six miles to be a rectangular reinforced concrete box section cover at street crossing.

Department of Commerce (Census Bureau):

Washington, $1,000,000, for construction of census annex.

Navy Department (Yards and Docks):

Cabin John, Md., $4,200,000, for naval model basins, buildings and accessories.

Philadelphia, $432,000, for addition to machine shop and building and accessories at navy yard.

Department of Agriculture (Entomology and Plant Quarantine):

Hoboken, N. J., $400,000, for acquisition of suitable site and construction and equipment of plant inspection house and garage within official port of New York.

PERSONALS

A. C. MUNDLE, heretofore assistant to the president, United States Steel Products Co., New York, has been made vice-president, effective June 1.

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J. B. STEWART, who has been identified with sales work in the plumbing and brass industries for more than 21 years, has been appointed regional manager of the new plumbing division of the Briggs Mfg. Co. in the territory including Michigan, Ohio, Indiana, Kentucky and western parts of New York, Pennsylvania and West Virginia.

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T. J. BRADY, formerly with the Accurate Tool Co., Detroit, has been added to the staff of United States Rubber Products, Inc., New York, to handle the sale of grinding wheels in the Detroit district.

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F. H. ROSENCRANTS, at one time chief engineer of International Combustion, Ltd., England, has been elected vice-president of the Combustion Engineering Co., Inc., New York. He will have charge of the proposition engineering department.

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P. W. BOWERS, of P. W. Bowers & Co., New York, has been re-elected president of the New York chapter of the Institute of Scrap Iron and Steel. Other officers elected at the recent annual meeting of the chapter include: First vice-president, DAVID STRAUSS of the Continental Iron & Steel Co.; second vice-president, THOMAS F. KELLY; secretary, GEORGE BETTEN of S. Betten & Sons, and treasurer, JOSEPH MOSKOWITZ of Samuel Sons Iron & Steel Co.

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R. M. NEUMANN, who has been identified with the New Jersey Zinc Co. since 1906, has been appointed manager of the pigment division of the New Jersey Zinc Sales Co., with headquarters in New York.

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GUY SCHAPIRO of the Newman Iron & Steel Co., Cleveland, has been elected president of the Cleveland-Detroit chapter of the Institute of Scrap Iron and Steel. BEN KRAMER of the Modell Iron & Metal Co., Detroit, has been made first vice-president; SAM KASLE, Kasle Iron & Metal Co., Toledo, is second vice-president; JOSEPH VASEK, Max Friedman Co., Cleveland, is secretary, and LOUIS MILLER, Columbia Iron & Metal Co., Cleveland, treasurer.

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M. G. CORSON, consulting engineer and specialist in metallurgical problems, New York, is in Milwaukee to spend a short time working with the technical staff of Ampco Metal, Inc. Mr. Corson, who was born in Russia, has been studying metals since 1912. He recently returned from Europe, where he spent considerable time as technical consultant to firms in France and Germany.

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COL. WILLIAM R. DUNLAP has been appointed special representative under L. H. BURNETT, vice-president, Carnegie Steel Co., Pittsburgh. Colonel Dunlap formerly was connected with the Carnegie Steel Co. at Homestead, Pa., where he was engaged in welfare, safety and personnel work. In March, 1931, he became City Director of Supplies at Pittsburgh, and in January, 1935, he became a deputy county vote machine custodian.

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L. DOUGLAS SMITH has been appointed vice-president of Lewis Foundry & Machine Co., Coraopolis, Pa., subsidiary of the Blaw-Knox Co., to fill the vacancy caused by the resignation of JAN R. DUNSFORD.

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JOSEPH H. GEPFERT, Cleveland district manager of the Reeves Pulley Co., has been elected president of the Cleveland Engineering Society for the ensuing year. FRED L. PLUMMER, associate professor of structural engineering at Case School of Applied Science, has been elected vice-president. New directors include WARD HARRISON, director of engineering, General Electric Co., Nela Park, Cleveland, and C. CLARK WALES, chief engineer of Otis Steel Co. The new officers were installed at the fifty-sixth annual dinner of the society at the Hotel Statler, June 11.

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R. E. LAWLOR has been appointed Detroit district sales manager of the Otis Steel Co., Cleveland, succeeding PAUL B. ALLEN, who was recently appointed general manager of sales with headquarters in Cleveland. Mr. Lawlor has been connected with the Detroit sales office of the Youngstown Sheet & Tube Co. CHARLES H. REESE, who has been connected with the Detroit sales office of the Otis company, has been appointed district sales manager in Cleveland, a newly created office.

OBITUARY

WILLARD A. VAN BRUNT, prominent in Wisconsin industry for many years, died on June 5 at Los Angeles, Calif., at the age of 88 years. He was born in Mayville, Wis., later founding the Van Brunt Mfg. Co. at Horicon, Wis., manufacturing farm machinery and implements. He sold the business to the John Deere interests in 1918 and moved to California. Less than a month before his death, the result of a fractured hip sustained in a fall aboard his yacht, Mr. Van Brunt mailed to 89 former employees and five widows of former workmen at Horicon each three $1,000 Government bonds, for an aggregate face value of $282,000, as an appreciation of loyalty. His residence in Horicon he deeded to the community as a community center endowed with a fund for perpetual care.

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FREDERICK A. TECKTONIUS, president of the E. C. Tecktonius Mfg. Co., hardware specialties, Racine, Wis., died June 6 of heart disease while on the witness stand in probate court during the final hearing on the estate of his father, the late E. C. Tecktonius, who founded the business in 1891. He was 56 years of age and a native of Racine.

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FRANK S. WATERS, president of the Lyon Metal Products Co., Aurora, Ill., died of a heart attack June 6, aged 57 years. Mr. Waters and his brother, Beverly, founded the products company in Chicago in 1889 and in 1906 moved the headquarters to Aurora. The Lyon company was merged in 1928 with the Durand Steel Locker Co., Chicago Heights.

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WILLIAM H. SMITH, president and general manager, Pioneer Alloy Products Co., Cleveland, died June 3, aged 61 years, after a four months' illness. He organized the Pioneer company in 1919 and previously had been connected for some years with the Cleveland Brass & Mfg. Co.

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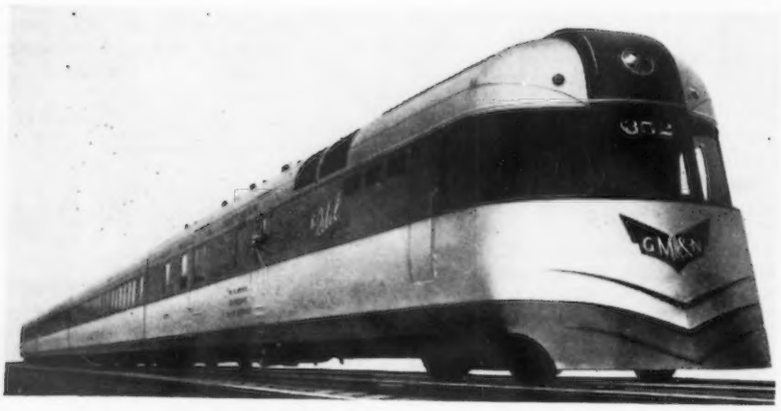
FRANK F. STORMS, president of the Storms Drop Forging Co., Springfield, Mass., died on June 2.



Streamlined Train of Gulf, Mobile & Northern Completed

THE Rebel, the South's first Diesel-electric streamlined train, designed and built by American Car & Foundry Co. for the Gulf, Mobile & Northern Railroad, is now en route over the Pennsylvania Lines to the home rails of the G. M. & N. at Jackson, Tenn. En route it will be exhibited at Pittsburgh, Youngstown, Akron, Chicago and St. Louis.

Featuring a new streamlined design, procured after exhaustive wind tunnel tests at New York University, a new arrangement of non-articulated coaches, power drive on the rear trucks of the motor unit, individually air-conditioned berths, the aluminum and scarlet colored train embodies the latest developments in this type of passenger equipment in the South.

Designed for day and night travel as the principal train over a 500-mile route between Jackson, Tenn., and New Orleans, La., the equipment is of standard width and is so arranged that it can be operated as a two, three or four-car train as the traffic demands. The cars are mounted on separate sets of trucks and are fastened together with a new tightlock coupler which leaves no slack and makes all air, steam and electrical connections automatically. They are built of Cor-ten, a steel alloy combining light weight with high tensile strength, spot-welded to eliminate all outside bolts and rivets.

The traction motors, receiving their power from a 660-hp. Diesel engine mounted over the front trucks, are carried over the rear trucks, an arrangement new to this country which permits equal distribution of weight.

Speed is estimated at 100 miles per hour, although the trains are not to be operated on extremely fast schedules. High-speed air brakes, with two brake shoes applied to every wheel of the train, reduce train speed three miles per hour for each second of application. At 60 miles per hour the train can be brought to a stop in 20 sec., within a distance of 880 ft.

The equipment of the Rebel consists of two three-car trains with one additional coach for set-out service. The four-car train will seat 152 people in day coaches and lounge, and carries six sleeping sections and a state room. The trains are air-conditioned throughout.

Seats in the regular coaches can be adjusted to fit the individual's requirements; ash trays are at every seat, built into the walls; drinking water is electrically cooled and all lavatories have hot and cold water, soap and towels; indirect lights provide soft general illumination while individual reading lights are at each seat; the observation car carries a built-in compartment for hand baggage; the day coach carries an electrically equipped buffet; each coach of the train is finished in a different color scheme, using two tones of the primary color with blending shades to match in carpets and tapestry. Entrance vestibules are in the center of the coaches, steps and doors folding flush into the sides of the train.

May Steel Output Declines

PRODUCTION of Bessemer and open-hearth steel ingots during May was 2,602,054 gross tons, according to the American Iron and Steel Institute. This 96,372 tons daily engaged the industry's rated capacity at 43.53 per cent.

April output was 2,606,311 gross tons, or 100,243 tons per day, equivalent to 45.28 per cent of capacity. In May, 1934, the industry made 3,352,788 gross tons, or 124,177 tons daily, equivalent to 56.40 per cent.

MONTHLY PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS

(Gross Tons)

Reported by Companies Which Made 99.32 Per Cent of Open-Hearth and 100 Per Cent of Bessemer Ingot Production in 1933

1934	Open-Hearth	Bessemer	Calculated Output All Companies Monthly	Calculated Output All Companies Daily	No. of Working Days	Per Cent Operation‡
January	1,786,467	172,489	1,970,979*	72,999*	27	33.15*
February	1,993,638	175,873	2,182,826*	90,951*	24	41.31*
March	2,540,143	203,904	2,760,888*	102,255*	27	46.44*
April	2,622,372	257,482	2,897,529*	115,901*	25	52.64*
May	3,000,624	331,620	3,352,695*	124,174*	27	56.39*
Five months	11,943,244	1,141,368	13,166,009	101,256	130	45.99
June	2,714,983	282,592	3,015,972	115,999	26	52.68
July	1,343,732	119,869	1,472,584	58,903	25	26.75
August	1,245,445	105,598	1,363,359	50,495	27	22.93
September	1,126,415	117,580	1,251,630	50,065	25	22.74
October	1,325,225	127,789	1,461,932	54,146	27	24.59
November	1,447,297	132,059	1,589,049	67,117	26	27.76
December	1,797,830	131,456	1,941,127	77,645	25	35.26
Total	25,944,171	2,162,311	25,260,570	81,224	311	36.89
1935						
January	2,576,671	239,858	2,834,170	104,969	27	47.42
February	2,500,062	224,336	2,742,125	114,255	24	51.61
March	2,582,211	230,810	2,830,700	108,873	26	49.18
April	2,358,249	231,916	2,606,311	100,243	26	45.28
May	2,331,297	254,796	2,602,054	96,372	27	43.53
Five months	12,348,490	1,181,716	13,615,360	104,942	130	47.40

*Revised.

‡The figures of "per cent of operation" are based on the annual capacity as of Dec. 31, 1933, of 68,478,813 gross tons for open-hearth and Bessemer steel ingots.

Steel Corporation Shipments Higher in May

STEEL shipments of the United States Steel Corpn. in May totaled 598,915 tons as compared with 591,728 tons in April. However, since May had an extra working day, the per diem rate of shipment declined, the rate for May being 35.8 per cent of capacity as against 36.7 per cent in the previous month.

MONTHLY SHIPMENTS OF STEEL PRODUCTS BY UNITED STATES STEEL CORPN.

				1933		1934		1935	
Month	1930	1931	1932	Shipments	Per Cent of Capacity	Shipments	Per Cent of Capacity	Shipments	Per Cent of Capacity
January	1,104,168	800,031	426,271	285,137	17.7	331,777	19.8	534,055	31.9
February	1,141,912	762,522	413,001	275,929	18.5	385,500	26.3	583,137	39.2
March	1,240,171	907,251	388,579	256,793	15.3	588,209	36.6	668,056	41.5
April	1,188,456	878,558	395,091	335,321	21.6	643,009	41.5	591,728	36.7
May	1,203,916	764,178	338,202	455,302	27.1	745,063	44.4	598,915	35.8
June	984,739	653,104	324,746	603,937	37.4	985,337	61.2	.....	...
July	946,745	593,900	272,448	701,322	45.1	369,938	23.0	.....	...
August	947,402	573,372	291,688	668,155	39.8	378,023	23.1	.....	...
September	867,282	486,928	316,019	575,161	35.6	370,306	23.0	.....	...
October	784,648	476,032	310,007	572,897	35.5	343,962	20.6	.....	...
November	676,016	435,697	275,594	430,358	26.7	366,119	22.9	.....	...
December	579,098	351,211	227,576	600,639	38.7	418,630	26.1	.....	...
Plus or minus yearly adjustment	(40,259)	(6,040)	(5,160)	(44,283)	...	(19,907)	...	.....	...
Total for year	11,624,294	7,676,744	3,974,062	5,805,235	30.1	5,905,966	30.6	.....	...

Revised NRA Bill Specifies Anti-Trust Law Exemptions

WASHINGTON, June 11.—The revised bill extending the NRA until April 1, 1936, and limiting the NRA strictly to voluntary trade agreements for fair trade practices, collective bargaining, minimum wages, maximum hours and prohibition of child labor, did not reach a final vote in the Senate today, and that body recessed until noon tomorrow when it will resume consideration of the measure.

Senator Pat Harrison, chairman of the Committee on Finance, introduced and explained the bill when the Senate convened shortly before noon today and made an effort to rush it to immediate passage, but it was laid aside temporarily while the Senate took up the public utility holding bill.

Because the provisions of the measure have been further narrowed by the Senate committee it will have to go back to the House in order that differences with the House bill which was passed by the House last week may be reconciled. It is necessary that the measure be finally enacted by June 16, the date of expiration of the existing act, invalidated by the Supreme Court decision in the Schechter case.

Abiding by the terms for voluntary agreements, the Senate bill exempts industry from the anti-trust laws. Going beyond them industry will be subject to anti-trust prosecution.

Definite warning was given by Senator Harrison that price fixing is barred, as is meeting of trade groups to consider other than unfair trade practices.

The Senate bill is held to be nothing more than a notification to industry that it can do things it was already at liberty to do under trade practice agreements with the Federal Trade Commission and that the skeletonized NRA can offer nothing that the commission could not offer, except as to assurance given labor.

The provisions as to minimum wages and maximum hours and prohibition against child labor are in accord with the bulk of industrial sentiment as denoted by agreements reached by steel and other major industries since the Supreme Court decision was handed down.

It is believed, however, that requirements for adhering to Section 7-a will be the source of discord in view of rights claimed under that section by organized labor. There is a definite belief too that, in view of the probability of passage of the Wagner-Connery labor disputes bill, organized labor will resort to this measure to buttress its demands as it intensifies efforts further to unionize industry.

The Senate NRA bill was revised as a compromise agreed upon by Senator Clark of Missouri and Donald R. Richberg, retiring chairman of NRA. Senator Clark insisted that the anti-trust laws be restored to full force except as to exemptions provided under the terms of voluntary agreements.

Senator Harrison said that the voluntary agreements, which must be approved by the President, will be subject to no outside enforcement other than the "contractual relationship" entered into by business and industry. He expressed the opinion that business and industry already have the right to meet together on given labor guarantees and unfair trade practices without being subject to anti-trust prosecution. He added, however, fear of the Sherman act might discourage such meetings.

Reports persist that the Administration proposes to submit supplemental NRA legislation of a more definite and broader character. Senator Harrison, however, said he hasn't the slightest intimation of any further legislation on NRA at present session of Congress.

A. F. of L. Charge of Steel Hour Stretching Controverted

PARKER F. WILSON, assistant to the president, Wheeling Steel Corpn., Wheeling, W. Va., has issued an emphatic denial of the recent published statement of the American Federation of Labor that the company had changed hourly schedules from eight to 10 hours per day at its Portsmouth, Ohio, plant. Mr. Wilson said:

"There is absolutely no foundation for the assertion by the American Federation of Labor that hourly schedules have been changed by the Wheeling Steel Corpn. in any of its plants since the decision of the Supreme Court."

A survey of all steel companies in the Chicago district reveals that no changes have been made in wages or hours by any of them, as was alleged in a recent statement released by the American Federation of Labor, according to a statement by the American Iron and Steel Institute.

Current Metal Working Activity Statistically Shown

These Data Are Assembled By THE IRON AGE From Recognized Sources And Are Changed Regularly As More Recent Figures Are Made Available. Boldface Type Indicates Changes This Week

Raw Materials:	May, 1935	April, 1935	May, 1934	Five Months, 1934	Five Months, 1935
Lake ore consumption (gross tons)[a]	.....	2,356,391	.....	.....	.....
Coke production (net tons)[b]	.....	2,736,723	3,255,069	14,538,372	.....
Pig Iron:					
Pig iron output—monthly (gross tons)[c]	**1,727,095**	1,663,475	2,042,896	7,868,180	8,246,486
Pig iron output—daily (gross tons)[c]	**55,713**	55,449	65,900	52,107	54,612
Castings:					
Malleable castings—production (net tons)[d]	.....	42,035	37,165	185,701	.....
Malleable castings—orders (net tons)[d]	.....	37,394	32,639	183,148	.....
Steel castings—production (net tons)[d]	.....	31,952	57,313	199,216	.....
Steel castings—orders (net tons)[d]	.....	28,233	46,831	232,013	.....
Steel Ingots:					
Steel ingot production—monthly (gross tons)[e]	**2,602,054**	2,606,311	3,352,788	13,166,381	13,615,360
Steel ingot production—daily (gross tons)[e]	**96,372**	100,243	124,177	101,280	104,734
Steel ingot production—per cent of capacity[e]	**43.53**	45.28	56.40	45.99	47.40
Employment in Steel Industry:					
Total employees[e]	.....	424,623	449,362	.....	.....
Total payrolls (thousands of dollars)[e]	.....	45,890	51,896	.....	.....
Average hours worked per week[e]	.....	34.2	37.1	.....	.....
Finished Steel:					
Trackwork shipments (net tons)[e]	**4,228**	4,472	5,764	22,463	17,365
Sheet steel sales (net tons)[f]	.....	168,093	246,315	1,070,789	.....
Sheet steel production (net tons)[f]	.....	209,219	.....	.....	.....
Fabricated shape orders (net tons)[g]	.....	91,228	78,608	200,160	.....
Fabricated shape shipments (net tons)[g]	.....	81,271	104,976	358,030	.....
Fabricated plate orders (net tons)[d]	.....	13,244	21,891	111,438	.....
Reinforcing bar awards (net tons)[c]	.....	30,490	.....	.....	.....
U. S. Steel Corpn. shipments (tons)[h]	**598,915**	591,728	745,063	2,693,558	2,975,891
Ohio River steel shipments (net tons)[i]	.....	57,825	73,361	252,714	.....
Fabricated Products:					
Automobile production, U. S. and Canada[k]	.....	501,837	350,616	1,475,965	.....
Construction contracts, 37 Eastern States[l]	.....	$124,098,000	.....	.....	.....
Steel barrel shipments (number)[d]	.....	610,848	489,186	3,129,765	.....
Steel furniture shipments (dollars)[d]	.....	$1,122,987	$1,010,528	$4,791,172	.....
Steel boiler orders (sq. ft.)[d]	.....	312,542	277,086	1,556,291	.....
Locomotive orders (number)[m]	.....	2	.....	.....	.....
Freight car orders (number)[m]	.....	600	.....	.....	.....
Machine tool index[n]	.....	65.6	45.9	†46.8	.....
Foundry equipment index[o]	.....	113.2	66.5	†69.9	.....
Foreign Trade:					
Total iron and steel imports (gross tons)[p]	.....	28,886	.....	.....	.....
Imports of pig iron (gross tons)[p]	.....	8,247	.....	.....	.....
Imports of all rolled steel (gross tons)[p]	.....	12,124	.....	.....	.....
Total iron and steel exports (gross tons)[p]	.....	205,336	.....	.....	.....
Exports of all rolled steel (gross tons)[p]	.....	64,625	.....	.....	.....
Exports of finished steel (gross tons)[p]	.....	54,034	.....	.....	.....
Exports of scrap (gross tons)[p]	.....	131,731	.....	.....	.....
British Production:					
British pig iron production (gross tons)[r]	.....	526,300	527,900	2,383,500	.....
British steel ingot production (gross tons)[r]	.....	808,700	780,000	3,749,800	.....
Non-Ferrous Metals:					
Lead production (net tons)[s]	.....	32,389	39,945	180,479	.....
Lead shipments (net tons)[s]	.....	40,922	29,485	150,168	.....
Zinc production (net tons)[t]	.....	35,334	30,944	158,848	.....
Zinc shipments (net tons)[t]	.....	38,460	35,589	159,679	.....
Deliveries of tin (gross tons)[v]	.....	5,025	.....	.....	.....

*Preliminary. †Three Months' Average.

Sources of figures: [a] Lake Superior Iron Ore Association; [b] Bureau of Mines; [c] THE IRON AGE; [d] Bureau of the Census; [e] American Iron and Steel Institute; [f] National Association of Flat-Rolled Steel Manufacturers; [g] American Institute of Steel Construction; [h] United States Steel Corpn.; [i] United States Engineer, Pittsburgh; [k] When preliminary, from Automobile Manufacturers Association—Final figures from Bureau of the Census; [l] F. W. Dodge Corpn.; [m] *Railway Age;* [n] National Machine Tool Builders Association; [o] Foundry Equipment Manufacturers Association; [p] Department of Commerce; [r] British Iron and Steel Federation; [s] American Bureau of Metal Statistics; [t] American Zinc Institute, Inc.; [v] New York Commodities Exchange.

Steel Prices Hold in Face of Seasonal Decline in Demand

Ingot Output Falls to 39½ Per Cent; Scrap Has Weaker Tone and Fuel Market Breaks Despite Anticipatory Buying

STEEL production continues to give ground to seasonal forces, the national rate having fallen two points from 41½ to 39½ per cent of capacity. Fuel prices have broken, with furnace coke off 35c. a ton to $3.50, Connellsville, and the scrap market has a weaker tone, a reduction at Chicago having depressed THE IRON AGE composite for heavy melting steel from $10.83 to $10.71 a ton. But prices of finished steel and pig iron are holding. Vague rumors are afloat regarding alleged price concessions, but to date the only irregularities uncovered concern intricate details as to extras, regarding which there were diverse interpretations even under the code, and distributers' resale quotations, which had been notably unstable in certain products for months before the Schechter decision laid the NRA low.

The whispering campaign that has been launched against the price structure has not deceived the industry any more than have the unsupported charges of organized labor regarding post-code changes in wages and working hours. In both cases the wish is the father of the thought. Similarly, Administration alarm over a possible renewal of price and wage chiseling is interpreted as feigned rather than genuine, since such a development would furnish the strongest argument for resurrecting the NRA with added, rather than reduced, powers.

IRON and steel producers, therefore, feel that they have more at stake in continued stability than to protect themselves from financial losses. They are well aware that freedom from bureaucratic interference carries with it the responsibility of preventing a collapse of existing price and wage structures. Many buyers, especially those of executive rank, are openly sympathetic with the determination of the industry to maintain a stable situation, but all consumers, regardless of their attitude, are following a policy of caution until the market has been given a real test.

With business entering the customarily dull season of the year, few attractive tonnages are before the trade or in early prospect. Steel buying for current models of automobiles, with the possible exception of Chevrolet, is over. Several motor car makers are holding up shipments of material already rolled, and parts makers have pared operations sharply. Little new tonnage is likely to be placed until mid-August, when preparatory work on new models will get under way.

HAVING discounted the impending period of reduced demand as a seasonal manifestation, iron and steel producers are expected to see the futility of a wide-open break in prices. Deviations from code levels, if they come, will probably first take the form of concessions on quantity purchases or departures from existing extras rather than of horizontal reductions in base quotations.

The success of the steel industry in maintaining stability will, of course, be influenced eventually by the reaction of other important industries to a codeless regime. In this connection it may or may not be significant that the emergency demand for fuel that has arisen in anticipation of a bituminous coal strike has not prevented a break in coal and coke prices.

TIN PLATE production has been reduced to 75 per cent of capacity because of a congestion of stocks in mill warehouses. The lateness of the early vegetable packs has held back shipping releases.

Sheet output has been pared down to 50 per cent and strip production to about 40 per cent. Steel pipe mill operations have been given a lift by a purchase of 13,500 tons for a gasoline line from Harrisburg to Pittsburgh.

Floods in western Kansas and adjacent areas have brought orders to Chicago district structural shops, besides speeding up releases against rail contracts and resulting in emergency purchases of 4000 tons of track supplies. Completion of rail orders in the South is causing an Alabama producer to shut down its rail mill and five open-hearth furnaces during the current week.

At Pittsburgh the rolling of a recent rail order has helped to raise ingot output one point to 35 per cent of capacity. Raw steel production is tending downward in most other centers, having fallen 1½ points to 42 per cent at Chicago, six points to 42 per cent in the Valleys, two points to 43 per cent in the Cleveland-Lorain area, six points to 35 per cent at Buffalo and 15 points to 48 per cent in the Wheeling district. Operations at Detroit remain at 95 per cent of capacity.

STRUCTURAL steel awards, including 9000 tons for a trestle at the Grand Coulee dam, total 12,915 tons, compared with 5700 tons last week. New projects call for 16,275 tons. Plate lettings account for 2800 tons, with 15,750 tons pending. Total awards to date of construction steel, including structural steel, plate work, steel piling and reinforcing, are 477,170 tons, as against 562,652 tons in the corresponding period in 1934.

The Canadian National has ordered 80,000 tons of rails, and the Wheeling & Lake Erie has placed 1100 tons. Oakland, Cal., has purchased 2650 tons of cast iron pipe.

THE IRON AGE composite prices for pig iron and finished steel are unchanged at $17.84 a ton and 2.124c. a lb. respectively.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

Per Gross Ton:	June 11, 1935	June 4, 1935	May 14, 1935	June 12, 1934
No. 2 fdy., Philadelphia	$20.3132	$20.3132	$20.3132	$20.26
No. 2, Valley furnace	18.50	18.50	18.50	18.50
No. 2 Southern, Cin'ti	19.2007	19.2007	19.13	19.13
No. 2, Birmingham†	14.50	14.50	14.50	14.50
No. 2 foundry, Chicago*	18.50	18.50	18.50	18.50
Basic, del'd eastern Pa.	19.8132	19.8132	19.76	19.76
Basic, Valley furnace	18.00	18.00	18.00	18.00
Malleable, Chicago*	18.50	18.50	18.50	18.50
Malleable, Valley	18.50	18.50	18.50	18.50
L. S. charcoal, Chicago	24.2528	24.2528	24.2528	24.04
Ferromanganese, seab'd carlots	85.00	85.00	85.00	85.00

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$36.37½	$36.37½	$36.37½	$36.37½
Light rails, Pittsburgh	35.00	35.00	35.00	35.00
Rerolling billets, Pittsburgh	27.00	27.00	27.00	29.00
Sheet bars, Pittsburgh	28.00	28.00	28.00	30.00
Slabs, Pittsburgh	27.00	27.00	27.00	29.00
Forging billets, Pittsburgh	32.00	32.00	32.00	34.00
Wire rods, Pittsburgh	38.00	38.00	38.00	38.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.70	1.70	1.70	1.70

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.80	1.80	1.80	1.90
Bars, Chicago	1.85	1.85	1.85	1.95
Bars, Cleveland	1.85	1.85	1.85	1.95
Bars, New York	2.15	2.15	2.15	2.23
Plates, Pittsburgh	1.80	1.80	1.80	1.85
Plates, Chicago	1.85	1.85	1.85	1.90
Plates, New York	2.09	2.09	2.09	2.13
Structural shapes, Pittsburgh	1.80	1.80	1.80	1.85
Structural shapes, Chicago	1.85	1.85	1.85	1.90
Structural shapes, New York	2.06¼	2.06¼	2.06¼	2.10¼
Cold-finished bars, Pittsburgh	1.95	1.95	1.95	2.10
Hot-rolled strips, Pittsburgh	1.85	1.85	1.85	2.00
Cold-rolled strips, Pittsburgh	2.60	2.60	2.60	2.80

Finished Steel

Per Lb.:	June 11, 1935 Cents	June 4, 1935 Cents	May 14, 1935 Cents	June 12, 1934 Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.40	2.40	2.40	2.65
Hot-rolled annealed sheets, No. 24, Gary	2.50	2.50	2.50	2.75
Sheets, galv., No. 24, P'gh	3.10	3.10	3.10	3.25
Sheets, galv., No. 24, Gary	3.20	3.20	3.20	3.35
Hot-rolled sheets, No. 10, P'gh	1.85	1.85	1.85	2.00
Hot-rolled sheets No. 10, Gary	1.95	1.95	1.95	2.10
Wire nails, Pittsburgh	2.60	2.60	2.60	2.60
Wire nails, Chicago dist. mill	2.65	2.65	2.65	2.65
Plain wire, Pittsburgh	2.30	2.30	2.30	2.30
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.35
Barbed wire, galv., P'gh	3.00	3.00	3.00	3.00
Barbed wire, galv., Chicago dist. mill	3.05	3.05	3.05	3.05
Tin plate, 100 lb. box, P'gh	5.25	5.25	5.25	5.25

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$11.75	$11.75	$11.50	$11.75
Heavy melting steel, Phila.	10.50	10.50	10.50	10.50
Heavy melting steel, Ch'go	9.87½	10.25	10.00	9.75
Carwheels, Chicago	10.50	10.50	10.50	9.75
Carwheels, Philadelphia	11.25	11.25	11.25	12.50
No. 1 cast, Pittsburgh	13.25	13.25	12.75	12.25
No. 1 cast, Philadelphia	11.25	11.25	11.25	12.25
No. 1 cast, Ch'go (net ton)	9.00	9.00	9.00	7.50
No. 1 RR. wrot., Phila.	10.25	10.25	10.25	12.25
No. 1 RR. wrot., Ch'go (net)	7.75	8.00	8.00	7.50

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.50	$3.85	$3.85	$3.85
Foundry coke, prompt	4.00	4.60	4.60	4.60

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery	8.75	8.75	8.75	8.75
Lake copper, New York	9.12½	9.12½	9.12½	9.12½
Tin (Straits), New York	50.50	51.00	50.75	51.25
Zinc, East St. Louis	4.25	4.30	4.20	4.25
Zinc, New York	4.62½	4.67½	4.57½	4.60
Lead, St. Louis	3.85	3.95	3.65	3.85
Lead, New York	4.00	4.10	3.80	4.00
Antimony (Asiatic), N. Y.	12.75	12.75	14.25	7.90

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
June 11, 1935	2.124c. a Lb.	$17.84 a Gross Ton	$10.71 a Gross Ton
One week ago	2.124c.	17.84	10.83
One month ago	2.124c.	17.83	10.67
One year ago	2.199c.	17.90	10.67
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel HIGH	Finished Steel LOW	Pig Iron HIGH	Pig Iron LOW	Steel Scrap HIGH	Steel Scrap LOW
1935	2.124c., Jan. 3	2.124c., Jan. 8	$17.90, Jan. 8	$17.83, May 14	$12.33, Jan. 8	$10.33, April 23
1934	2.199c., April 24	2.008c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	2.015c., Oct. 3	1.867c., April 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

Output Up in Pittsburgh, Down in Valleys

Iron and Steel Prices Hold in Face of Consumer Apathy—Fuel Prices Break—Scrap Market Fairly Steady

PITTSBURGH, June 11.—Steel ingot production in the Pittsburgh district has advanced one point this week to 35 per cent of capacity. This advance cannot be regarded as an outgrowth of consumer demand, but rather coincides with increased turns at some mills, where nominations and elections of employee representatives are being held this week. Rolling at the local rail mill against the 7600-ton rail order placed about a month ago by the Akron-Canton-Youngstown will add to activity in this district. Some smaller independent producers are not faring so well, and one mill has suspended open-hearth operations probably until next Monday.

Although continued recession in finished steel demand is not alarming, the rate of new orders is scarcely keeping pace with current raw steel output, and there is scattered evidence of banking of ingots. Stocking may partly be sponsored by the impending bituminous walkout, but this contingency generally has not been paramount in this district.

Few orders have reached this district for third quarter delivery, and the unchanged hand-to-mouth policy of most consumers has failed to provide a test of codeless prices. Some consumers continue to shop for lower prices, but thus far base quotations on all steel products have remained invulnerable. Reports of waiving of minor extras have failed to shake the firm attitude of most producers on the subject of prices.

Raw steel output in the Valleys and nearby northern Ohio mills has fallen six points to 42 per cent, despite the fact that a leading independent mill there is operating 11 out of 12 open-hearths. Suspension of tin mill operations in the Wheeling district is a leading contributing cause to a 15-point drop in steel ingot output there to 48 per cent.

Finishing mill schedules are being pared gradually, with sheet production around 50 per cent, and strip steel at around 40 per cent. Tin plate output for the industry is only moderately lower at 75 per cent.

Soft coal production has increased sharply in anticipation of the strike called for June 16.

Pig Iron

Demand continues to be extremely light. Practically all buying is for spot shipment. Third quarter requirements have been obscured by recent developments, and consumers evidently are awaiting clarification of general market conditions before discussing their moderate forward needs. The absence of pressure for lower prices is not considered unusual in the face of such restricted buying.

Semi-Finished Steel

Aggregate volume has shrunk slightly, and few non-integrated mills have covered into third quarter. Skelp continues to be in steady demand. Interest in sheet bars has tapered further, while calls for wire rods are fewer. Buyers of semi-finished grades have not openly pressed for lower prices, and sellers manifest no evidence of cutting current quotations for the time being.

Bolts, Nuts and Rivets

Few third quarter contracts have been closed since the opening of books for that period last week. June shipments are running behind May tonnage, and producers are not sanguine of any reversal in conditions this month. Large manufacturers are insisting upon adherence to current discount cards, but concessions continue to crop out here and there.

Reinforcing Steel

New billet reinforcing producers are adhering to base quotations. The only deviations from current price schedules deal with freight and switching charges from various basing points to destination. There is yet little evidence of any softening in the general price structure. The P-K Construction Co., Pittsburgh, has received the general contract for part of the construction of the American Oil Co. depot at Hays, Pa., which will require a round tonnage of reinforcing steel.

Cold-Finished Bars

Demand from automotive sources has narrowed. Specifications from Ford and Chevrolet are smaller, while those from Chrysler are in more substantial proportions. Shipments to the agricultural implement industry are decreasing, while the movement to jobbers is a shade heavier. Since the lifting of code restrictions consumers have assumed a cautious attitude in buying, but thus far the price situation has not been disturbed by the code's passing.

Plates and Shapes

A fairly substantial demand for plates will be created if tentative plans for barge construction crystallize. The Mississippi Valley Barge Lines Co., Cincinnati, may proceed soon with plans for a large fleet of steel barges, but definite inquiry has not been issued. While railroad equipment construction at present is accounting for only a relatively small flow of plates, bids being taken on coal cars by the Chesapeake & Ohio are expected to lead to substantial steel tonnage.

The structural steel market continues to be quiet, with awards for the past week in smaller volume. New public work is appearing slowly as a consequence of general delays in launching the Federal works relief program, while private construction work recently reported here showed an encouraging pick up.

Sheet Steel Piling

Bids will be taken soon by the United States Engineer office at Wilmington, Del., on a breakwater which will require about 1200 tons. A fair tonnage is in the making for shore protection along the New Jersey coast. It is estimated that each project in this work will take from 700 to 1500 tons.

Tubular Products

The operating subsidiary of the Atlantic Refining Co., Philadelphia, has placed 13,500 tons of 8⅝-in. line pipe with the National Tube Co., Pittsburgh, for a gasoline line from Harrisburg to the vicinity of Pittsburgh. Delivery of the pipe will be made in 45 days. The pipe market is following an unusually steady tread. Demand for oil country goods is well sustained, and is the keystone in the current market. Some minor changes in extras covering seamless commercial boiler tubes for third quarter shipment have been established, as follows: 40,000

lb. or ft., or over, takes the base price; 25,000 to 39,999, plus 5 per cent; 12,000 to 24,999, plus 12½ per cent; 6000 to 11,999, plus 25 per cent; 2000 to 5999, plus 35 per cent; under 2000 plus 50 per cent.

Bars

While specifications from the automotive industry continue to decline, miscellaneous bookings are encouragingly steady. The even tenor of demand from farm equipment manufacturers is another bright spot. The movement of hot-rolled bars to the cold-finished industry is spotty. Hot-rolled bar producers have remained indifferent to the expectations of some consumers of lower prices since the code's legality was overthrown.

Wire Products

The availability of fall terms on June 1 has opened up a fairly substantial demand for wire fencing. Otherwise interest in wire goods is declining moderately, with automotive demand noticeably on the wane. The price situation appears to be unruffled by reports of deviations from accepted code methods of quoting. The irregularities are reported to concern only intricate details of extras, which even during the code's existence left room for diverse interpretations.

Sheets

Automotive demand has narrowed further, but miscellaneous requirements are surprisingly well sustained. Sheet mill output in the current week probably will average not lower than 50 per cent. Buyers are placing forward orders stintingly, and third quarter sheet requirements have not been covered to any noticeable extent.

Tin Plate

With some mills' yards glutted with stocks produced on order, complete suspension of operations has been made imperative. A leading independent producer, however, has resumed rolling at all of its mills. The net result is a moderate drop in output for the industry to about 75 per cent. It is believed that stocks of tin plate in the hands of producers are at a peak for all time, but some relief will be afforded when shipping releases are placed for the early pea crop this month. The primary cause for stock congestion is the lateness of the early vegetable season this year.

Strip Steel

A few small orders are drifting in from several General Motors units for body and body hardware work. But automotive buying, on a whole, is noticeably lighter. Demand from farm implement industry is steady. Jobbers are a little slower in placing orders. Hot-rolled strip production is slightly lower at about 40 per cent. Only casual approaches are reported to have been made by some consumers for lower prices. Strip producers are holding firmly to current quotations.

Coke and Coal

The emergency demand that has sprung up in anticipation of the bituminous mine suspension on June 16 has tempted many small idle mines to resume operations. Not all current production is being absorbed, despite anticipatory buying, and a surplus of inferior grades of coal is piling up on track. In the event the strike is averted, the accumulations on track would naturally affect the price structure. The railroads have been leading in the anticipatory covering, while industrial plants and public utilities have not participated so actively. Prolonged absence of major coke demand has affected prices, which have fallen below former levels set up by code authority.

Scrap

No. 1 heavy melting steel has been sold in moderate lots within the past few days at $11.75 and $12, delivered. Although scrap prices in this district are nominally unchanged, with the exception of machine shop turnings and short shoveling turnings which are lower, the market leans toward the weak side. Mills are hesitant about covering in the face of the impending bituminous coal strike and lingering uncertainties following the NIRA'S abrupt end. The virtual withdrawal from the market of an independent mill in a nearby district has taken further support from the market. Railroad scrap evidently is contradicting the trend in dealer material. No. 1 steel on the recent Baltimore & Ohio list is reported to have brought $13.10, and the similar grade on the Pennsylvania Railroad list is reported to have brought $13.20 and lower, both delivered Steubenville, Ohio. No. 1 steel on the New York Central list was disposed of at $11.75, delivered Youngstown.

Valley Operations Give Further Ground As Demand Shows Seasonal Decline

YOUNGSTOWN, June 10.—Seasonal declines in demand for finished steel are beginning to be reflected in Valley ingot production schedules. In the current week, ouput will be curtailed at several mills. The leading producer will drop three open-hearths, the Republic Steel Corpn. will take off at least two furnaces, while the Youngstown Sheet & Tube Co. will continue 11 open-hearths at its Campbell works. The last-named producer's new strip mill is operating three turns.

The early outlook for any further marked change in activity is rather uncertain. The imminence of the bituminous coal strike, while not yet affecting steel demand, is a source of uneasiness to steel producers, despite reports of fairly ample stocks of fuel on mill yards. If a mine walk-out on June 16 is not averted, it is considered likely that the most serious effects will center in the "captive" mines. The demands of the mine unions also are expected to be concertedly repulsed by Southern operators, and no quick solution is now in sight, except the possibility of intervention by the Federal Government.

The uncertainty that was attached to steel prices after the toppling of the steel code's legality has been partly, if not entirely, cleared. The fact that steel buying is continuing on a hand-to-mouth basis, with third quarter requirements practically untouched, is not considered to be significant, since it merely continues a policy that has ruled since the beginning of the year. Valley producers are united in their intentions to adhere to code policies and practices and expect to adhere rigidly to base quotations. The industry in this district also is mindful of the necessity for maintaining minimum wage scales and maximum working hours. Some minor revisions may be made in working schedules, but in no instance will the changes work to the disadvantage, financially, of the mill employees.

The raw materials markets here are being affected by the downward trend in steel buying. The scrap market has turned soft, despite the unfilled orders held by some dealers who shared in the substantial scrap purchases of a leading independent mill in May. Some old high-priced orders are still outstanding as a result of shipping hold-ups at one mill. No. 1 heavy melting steel now is nominally quotable at around $12, delivered Youngstown district.

Mill equipment manufacturers report heavier inquiry, and one or two plants have stepped up their weekly schedules.

Chicago Rate Is Down 1½ Points to 42 Per Cent

Buyers Mark Time as Sellers Adhere To Code Prices—Western Floods Stimulate Demand for Shapes and Track Steel

CHICAGO, June 11.—The Chicago iron and steel market is without a flurry of any kind and is following its usual trend for June. Ingot production is off one and one-half points to 42 per cent of capacity. This drop over a period of a week is considered normal by the trade, which believes that a fall revival in demand will come in August. Sales are very light and a forward commitment is the exception.

However, this situation is as much the result of the attitude of sellers as it is of the desire of buyers to await developments. Prices are holding all along the line and it is the intention of producers to hold present structures, though not knowing at this time what the reaction to the end of code rule will be among large industries other than iron and steel. There is some hesitancy on the part of sellers to force the issue in the matter of long-time commitments.

Structural awards in the Chicago area are very light and no private work appears among new inquiries of 100 tons or more each. Floods in western Kansas and nearby areas have torn out miles of railroad track and many bridges. Structural shops will benefit and rail mills are already feeling the effects in faster releases against rail contracts and in orders for about 4000 tons of emergency track accessories.

Mills view the long-range outlook for structural shapes as promising, but they are counting heavily on public funds to give them support.

Pig Iron

Shipments are tapering but the change is gradual and, according to the trade, is following a normal early summer trend. Contracting is very slow and the market promises to remain on a spot basis for some time to come. Prices remain steady.

Coke

By-product foundry coke, delivered in the Chicago switching area, is steady at $8.50 a ton. Shipments are slightly lower in conformity with a lighter melt.

Cast Iron Pipe

New business is on a broader scale but it consists almost wholly of carload orders. The Sanitary District, Chicago, has placed 550 tons and attractive tonnages are yet to come from that source. Releases against old orders are in better volume, but much work is being held in check pending determination of certain FERA labor policies. Chicago is advertising for 203 tons of standard special castings and 113 tons of offset bends. Prices remain steady.

Reinforcing Bars

Local dealers have pledged support to price schedules and certain fair trade practices. The one serious evil to be eradicated, one which had grown rapidly before the end of NRA, is that of rebating. It remains to be seen whether or not the honor system will accomplish what penalties could not stem. The Chicago & North Western has plans prepared for 12 overhead crossings in northern Illinois and southern Wisconsin. Similar programs to be understaken by states in the upper Mississippi Valley are still in various preliminary stages. Fresh inquiries are all small but in good number. Many come from industrial plants that are making alterations.

Wire Products

The end of NRA has struck home at one point and that is in the matter of fall terms on woven wire fencing which were announced late in May. Up to a few days ago salesmen had been making contracts and home offices had been sitting back waiting for fence orders to pour in. No such thing happened and sellers are now willing to admit that buyers up and down the line, and regardless of inducements such as fall terms, are going to watch developments and not make forward commitments at this time. Backlogs on wire and wire products are of fair size and, notwithstanding that new business is turning downward, mills are holding operations on the basis of current shipments, which have varied little in the past few weeks. Prices remain steady but the question of jobbers' terms is up for much discussion. The trade views the situation as one influenced by seasonal factors and believes that an August upturn in business is in prospect.

Structural Material

It is reported here that Consolidated Steel Corpn., Los Angeles, has taken 9000 tons for a construction trestle at the Grand Coulee Dam, Washington. The local market is drab though some producers feel that demand for structural shapes will soon turn upward. Fresh inquiries, except for the 5600 tons that will be used for gates at the Booneville Dam, are all small, ranging downward from 400 tons. This is the first time for many weeks that no private tonnage appears among inquiries.

Plates

Chicago surface lines are now definitely in the market for 100 street cars. Otherwise railroad equipment is quiet. Railroad shops are taking very limited quantities of steel and practically all the steel needed for the 500 Burlington cars has been shipped to the Aurora, Ill., shops.

Sheets

Demand from automobile manufacturers continues to taper and smaller quantities of galvanized sheets are moving from mills. On the other hand, container manufacturers are busy and are free in making known their steel requirements. All prices are holding.

Rails

Floods in the Western states are now contributing to the tonnages coming to rail mills. They have brought no new rail business but they have forced some railroads to hurry rail releases. In the matter of track accessories there are new orders at hand for about 4000 tons, most of which will be used in flood-stricken areas. Sellers are watching the Milwaukee Road, which may buy rails this summer.

Bars

Demand continues to dwindle, but the change is small and therefore does not worry producers who explain it as being due to the slowing up of the automobile industry and also to general seasonal influences. It is believed that automobile plants have some steel and also many parts in stock and therefore steel releases in June will not be in proportion to car assemblies. The Case plant at Racine, Wis., now freed from labor troubles, is ordering out steel, and other farm implement manufacturers report

no ground lost and here and there one is to be found that is actually increasing production. Jobbers and warehouses are distributing liberal quantities of bars.

Scrap

Heavy melting steel is off 50c. a gross ton to $10 at the top. Some other grades have followed suit as the entire market displays weakness. Lower prices are checking offerings, especially from yard dealers, who find themselves with fair quantities of scrap on the ground, though not all of it is of first grade. Mill inspections have been very rigid in recent months and much of the cream has been skimmed from dealers' piles. Offerings of railroad scrap that will reach this district are light. Relaying rails 60 lb. and heavier are quotable at $20 to $22 a ton.

Large Rail Order Placed in Canada

TORONTO, ONT., June 11.—With new financing provided, Canadian railway companies have started to place orders in connection with a new equipment buying program calling for an expenditure of $15,000,000. In this connection it is announced from Ottawa that an 80,000-ton steel rail order to be divided equally between the Dominion Steel & Coal Corpn., Sydney, N. S., and Algoma Steel Corpn., Sault Ste. Marie, Ont., has been arranged by the Dominion Government as a reemployment measure. The rails will be delivered to the Canadian National Railways when needed and will be paid for on delivery.

In the Canadian pig iron markets business shows minor improvement, with awards for the week around 700 tons. Melters, however, continue to buy on a hand-to-mouth basis, and no forward delivery contracts have been placed. The daliy melt is holding between 40 and 45 per cent. Production is unchanged, with indications of an early increase as a result of the new rail contracts. Prices are firm and unchanged.

Trading in scrap is again improving. The mills in the Hamilton, Ont., district have settled labor troubles, and full crews are working in the sheet mill. It is stated that the Steel Co. of Canada, Ltd., is taking delivery of heavy melting steel and some other steel grades, but turnings are moving slowly. In the Montreal market demand for scrap is more active, with principal buying in the steel grades. Price lists are unchanged.

Boston Scrap Prices Hold Up Well

BOSTON, June 11.—Scrap prices hold up well despite some talk of weakness in those for Pennsylvania delivery contracts. Exporters continue to pay $8.50 a ton, delivered army base, for No. 1 steel, $7.50 a ton for No. 2 steel and former prices for other materials. Virtually no sales were made the past week for Pennsylvania, which accounts for prices not changing, and the American Steel & Wire Co., Worcester, Mass., has withdrawn from the market. A steamer here started loading 3,000 tons of scrap yesterday for export, another is taking 2,000 tons of Nos. 1 and 2 steel, stove plate, steel turnings and motor blocks at Providence, R. I., and a third boat will start loading 3,000 to 4,000 tons at the Rhode Island port this week, mostly textile and No. 2 cast. Destinations of exports have not been made public. Recent exports, in addition to 12,291 tons to Roumania, included 400 tons to "an oriental port," and 981 pieces of heavy scrap metal to Rotterdam.

Pig iron prices also are holding despite a slackening in demand. A small tonnage of Russian iron is offered, f.o.b. Providence, R. I., but no sales have been made. Foundries report it can be purchased at $1 to $2 a ton less than domestic iron.

Steel mills, cast iron pipe foundries and warehouses have not resorted to price cutting and apparently have no intention of doing so within the near future. The price situation so far as steel fabrication is concerned is not so stable.

Construction Activity Slackens on Coast

SAN FRANCISCO, June 10.—The recent elimination of the NRA and the delay in getting public works under way are believed by many to be responsible for the tendency of construction activity to slacken during the past few weeks. Although immediate changes in the price schedule are not looked for, it is reported that some awards are being held in abeyance.

The seven Pacific Coast States have been apportioned $17,964,208 for the elimination of hazards at railroad grade crossings and an additional $22,915,547 for road and highway improvements. The allocations have been approved and work is expected to be started within the next 30 to 60 days. Large appropriations have also been made for Army and Navy base improvements on the Coast and at Pearl Harbor, T. H.

The Reconstruction Finance Corpn. has agreed to purchase $36,000,000 worth of Metropolitan Water District bonds, which will finance preliminary work on the 237-mile transmission line from Boulder Dam, five pumping plants, Cajalso Dam and 150 miles of initial aqueduct distributing pipe lines. Bids are expected to be opened within the next 30 days on 6500 tons of structural steel for use on the transmission line.

United States Engineers are opening bids July 9 at Portland, Ore., for seven intake gates for the Bonneville powerhouse, 19 steel gates for the spillway dam and four gantry cranes. Approximately 5600 tons of structural steel, 332 tons of steel castings and 449 tons of miscellaneous steel are involved.

At Almira, Wash., it is reported that the award of the Grand Coulee construction trestle will be delayed for about 30 days. From 2600 to 4400 tons of structural steel will be required. Spillway Builders, Inc., is low bidder on the retaining walls at Fort Peck Dam, which include 9400 tons of sheet piling. The only major award during the week was for 2650 tons of cast iron pipe, let by Oakland, Cal., to United States Pipe & Foundry Co. New projects were few and for minor tonnages.

Railroad Equipment

Chicago Surface Lines are in the market for 100 street cars.

Chesapeake & Ohio is inquiring for five passenger locomotives of 4-8-4 type with tenders.

Chicago, Rock Island & Pacific is asking for bids on converting 320 wooden box cars to stock cars.

Trustees of St. Louis-San Francisco have petitioned for authority to convert two parlor cars into air-conditioned cafe lounge cars at a cost of $47,730; also to dismantle 23 small locomotives, two chair cars, three coaches, 24 flat cars, 25 cabooses, 36 box cars, four ice cars, 82 ventilated box cars, 15 flat cars, 28 stock cars, one coal car, and five units of work equipment, total value $805,663.

RAILS AND TRACK SUPPLIES

Canadian National Railways have ordered 80,000 tons of rails, of which 40,000 tons went to Algoma Steel Corpn. and an equal amount to Dominion Steel & Coal Corpn.

Pennsylvania Railroad, Philadelphia, E. J. Lamneck, purchasing agent, asks bids until June 18 for track spikes, tie plates, joint bars, nails, floor plates, wheels and axles, piston heads, etc. (Contract 6-1935).

Bethlehem Steel Co. is low bidder on 667 tons of rails, 78 tons of angles and 225 tons of spikes, bolts and tie plates for Bonneville railroad relocation.

Prices of Finished Steel and Iron Products

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel	*Base per Lb.*
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
F.o.b. Duluth	1.95c.
Del'd Detroit	1.95c.
F.o.b. Cleveland	1.85c.
F.o.b. Buffalo	1.90c.
Del'd Philadelphia	2.11c.
Del'd New York	2.15c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Rail Steel

(For merchant trade)

F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Gary	1.75c.
F.o.b. Moline, Ill.	1.75c.
F.o.b. Cleveland	1.75c.
F.o.b. Buffalo	1.80c.
F.o.b. Birmingham	1.85c.
F.o.b. cars dock Gulf ports	2.10c.
F.o.b. cars dock Pacific ports	2.25c.

Billet Steel Reinforcing

(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
F.o.b. Gary	2.10c.
Del'd Detroit	2.20c.
F.o.b. Cleveland	2.10c.
F.o.b. Youngstown	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. Birmingham	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Rail Steel Reinforcing

(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago	1.95c.
F.o.b. Gary	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.30c.

Iron

F.o.b. Chicago	1.80c.
F.o.b. Terre Haute, Ind.	1.75c.
F.o.b. Louisville, Ky.	2.10c.
F.o.b. Danville, Pa.	1.80c.
F.o.b. Berwick, Pa.	1.70c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	1.95c.
F.o.b. Chicago	2.00c.
F.o.b. Gary	2.00c.
F.o.b. Cleveland	2.00c.
F.o.b. Buffalo	2.05c.
Del'd Detroit	2.15c.
Del'd eastern Michigan	2.20c.

*In quantities of 10,000 to 19,000 lb.

Fence and Sign Posts

Angle Line Posts	*Base per Net Ton*
F.o.b. Pittsburgh	$50.00
F.o.b. Chicago	50.00
F.o.b. Duluth	51.00
F.o.b. Cleveland	50.00
F.o.b. Birmingham	53.00
F.o.b. Houston, Orange, Beaumont, Galveston	59.00
F.o.b. Mobile	58.00
F.o.b. New Orleans, Lake Charles, Corpus Christi	59.00
F.o.b. cars dock Pacific ports	63.00

Plates

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c
F.o.b. Gary	1.85c.
Del'd Cleveland	1.995c.
F.o.b. Coatesville	1.90c.
F.o.b. Sparrows Point	1.90c.
Del'd Philadelphia	1.99c.
Del'd New York	2.09c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.
Wrought iron plates, f.o.b. P'gh	3.20c.

Floor Plates

F.o.b. Pittsburgh	3.35c.
F.o.b. Chicago	3.40c.
F.o.b. Coatesville	3.45c.
F.o.b. cars dock Gulf ports	3.75c.
F.o.b. cars dock Pacific ports	3.90c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
Del'd Cleveland	1.995c.
F.o.b. Buffalo	1.90c.
F.o.b. Bethlehem	1.90c.
Del'd Philadelphia	2.015c.
Del'd New York	2.0625c.
F.o.b. Birmingham (standard)	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.15c.
F.o.b. Chicago	2.25c.
F.o.b. Buffalo	2.25c.
F.o.b. cars dock Gulf ports	2.60c.
F.o.b. cars dock Pacific ports	2.60c.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.85c.
No. 10, f.o.b. Gary	1.95c.
No. 10, del'd Detroit	2.05c.
No. 10, del'd Phila.	2.16c.
No. 10, f.o.b. Birmingham	2.00c.
No. 10, f.o.b. dock cars Pacific ports	2.40c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Gary	2.50c.
No. 24, del'd Detroit	2.60c.
No. 24, del'd Phila.	2.71c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, f.o.b. dock cars Pacific ports	3.05c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.50c.
No. 10 gage, f.o.b. Gary	2.60c.
No. 10 gage, del'd Detroit	2.70c.
No. 10 gage, del'd Phila.	2.81c.
No. 10 gage, f.o.b. Birmingham	2.65c.
No. 10 gage, f.o.b. dock cars Pacific ports	3.10c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Gary	3.05c.
No. 20 gage, del'd Detroit	3.15c.
No. 20 gage, del'd Phila.	3.26c.
No. 20 gage, f.o.b. Birmingham	3.10c.
No. 24, f.o.b. dock cars Pacific ports	3.50c.

Galvanized Sheets

No. 24 gage, f.o.b. Pittsburgh	3.10c.
No. 24, f.o.b. Gary	3.20c.
No. 24, del'd Phila.	3.41c.
No. 24, f.o.b. Birmingham	3.25c.
No. 24, f.o.b. dock cars Pacific ports	3.70c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	3.40c.
F.o.b. Gary	3.50c.
F.o.b. cars dock Pacific ports	4.10c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.75c.
No. 28, Gary	2.85c.
No. 28, cars dock Pacific Coast ports	3.35c.

Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mill	$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., P'gh	1.85c.
All widths up to 24 in., Chicago	1.95c.
All widths up to 24 in., del'd Detroit	2.05c.
All widths up to 24 in., Birmingham	2.00c.
Cooperage stock, Pittsburgh	2.10c.
Cooperage stock, Chicago	2.20c.

Cold-Rolled Strips

	Base per Lb.
F.o.b. Pittsburgh	2.60c.
F.o.b. Cleveland	2.60c.
Del'd Chicago	2.895c.
F.o.b. Worcester	2.80c.

Fender Stock

No. 14, Pittsburgh or Cleveland	2.90c.
No. 14, Worcester	3.30c.
No. 20, Pittsburgh or Cleveland	3.30c.
No. 20, Worcester	3.70c.

Hot-Rolled Rail Steel Strips

	Base per Lb.
F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Birmingham	1.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade	*Per Lb.*
Bright wire	2.30c.
Spring wire	2.90c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $2 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To Jobbing Trade

Qualified jobbers are entitled to a reduction of 20c. a 100 lb. from the base price on carload shipments to stock, and of 10c. a 100 lb. on less-carload shipments to stock.

	Base per Keg
Standard wire nails	$2.60
Smooth coated nails	2.60
Galvanized nails:	
15 gage and coarser	4.60
16 gage and finer	5.10

	Base per 100 Lb.
Annealed fence wire	$2.45
Galvanized fence wire	2.80
Polished staples	3.30
Galvanized staples	3.55
Barbed wire, galvanized	3.00
Woven wire fence, base column	63.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $2 a ton over Pittsburgh (except for woven wire fence at Duluth which is $3 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh, while Pacific Coast prices are $8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are $11 a ton above Pittsburgh.

On staples and barbed wire, prices of $6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

Wire Hoops, Twisted or Welded

	Off List
F.o.b. Pittsburgh	35 and 2½ off
F.o.b. Chicago	35 off

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio Mills

F.o.b. Pittsburgh only on wrought iron pipe

Butt Weld

Steel Inches	Black	Galv.	*Wrought Iron* Inches	Black	Galv.
⅛	51½	29½	⅛	+91½	+138
¼ to ⅜	53½	35	¼ & ⅜	+1½	+21½
½	58½	47	½	31½	15
¾	62	52	¾	36½	20½
1 to 3	64	55	1 & 1¼	39½	25½
			1½	43½	28
			2	41½	26

Lap Weld

2	60	51	2	37	22½
2½ to 3	63	54	2½ to 3½	38	25
3½ to 6	65	56	4 to 8	40	28½
7 and 8	64	54	9 to 12	38	24½
9 and 10	63½	53½			
11 and 12	62½	52½			

Butt Weld, extra strong, plain ends

⅛	48½	33½	¼	+13	+45½
¼ to ⅜	51	38	¼ & ⅜	+2½	+34½
½	56½	47½	½	32½	17½
¾	61	52	¾	37½	22½
1 to 3	63	55	1 to 2	43½	29

Lap Weld, extra strong, plain ends

2	58	50	2	40	26
2½ to 3	62	54	2½ to 4	45½	33
3½ to 6	65½	57½	4½ to 6	45	33½
7 and 8	64½	54½	7 & 8	46	33
9 and 10	63½	53½	9 to 12	41½	30
11 and 12	62½	52½			

On standard steel pipe an extra 5% off is allowed on sales to consumers while two 5's off apply on sales to jobbers. On less-than-carload shipments prices are determined by adding 20 and 25% and the carload freight rate to the base card. On structural steel pipe the base card is reduced 2 points and two 5's off are allowed to consumers and three 5's off to jobbers.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 8.60	$7.82
1¼ in. o.d.	13 B.W.G.	10.19	9.26
1½ in. o.d.	13 B.W.G.	11.26	10.23
1¾ in. o.d.	13 B.W.G.	12.81	11.64
2 in. o.d.	13 B.W.G.	14.35	13.04
2¼ in. o.d.	13 B.W.G.	16.00	14.54
2½ in. o.d.	12 B.W.G.	17.61	16.01
2½ in. o.d.	12 B.W.G.	19.29	17.54
2¾ in. o.d.	12 B.W.G.	20.45	18.59
3 in. o.d.	12 B.W.G.	21.45	19.50
4½ in. o.d.	10 B.W.G.	41.08	37.35
3½ in. o.d.	11 B.W.G.	27.09	24.62
4 in. o.d.	10 B.W.G.	33.60	30.54
4½ in. o.d.	10 B.W.G.	41.08	37.35
5 in. o.d.	9 B.W.G.	51.56	46.87
6 in. o.d.	7 B.W.G.	79.15	71.96

Extras for less-carload quantities:

25,000 lb. or ft. to 39,999 lb. or ft.	5 %
12,000 lb. or ft. to 24,999 lb. or ft.	12½ %
6,000 lb. or ft. to 11,999 lb. or ft.	25 %
2,000 lb. or ft. to 5,999 lb. or ft.	35 %
Under 2,000 lb. or ft.	50 %

Lapweld Steel and Knobbled Charcoal Iron Pressure Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots)

		Steel	*Iron*
1½ in o.d.	13 B.W.G.	$ 9.72	$20.16
1¾ in. o.d.	13 B.K.G.	11.06	21.84
2 in. o.d.	13 B.W.G.	12.38	17.23
2¼ in. o.d.	13 B.W.G.	13.79	19.58
2½ in. o.d.	12 B.W.G.	16.58	24.19
2¾ in. o.d.	12 B.W.G.	17.54	26.46
3 in. o.d.	12 B.W.G.	18.35	28.39
3¼ in. o.d.	11 B.W.G.	21.56	33.95
3½ in. o.d.	11 B.W.G.	23.15	36.16
4 in. o.d.	10 B.W.G.	28.66	45.36
4½ in. o.d.	10 B.W.G.	35.22	50.48
5 in. o.d.	9 B.W.G.	44.25	61.86
6 in o.d.	7 B.W.G.	68.14	102.46

Quantity Extras:

40,000 lb or ft.	base
25,000 lb. or ft. to 39,999 lb. or ft.	plus 5%
10,000 lb. or ft. to 24,999 lb. or ft.	plus 12½ %
2,000 lb. or ft. to 9,999 lb. or ft.	plus 25%
Under 2,000 lb. or ft.	plus 40%

CAST IRON WATER PIPE

	Per Net Ton
*6-in. and larger, del'd Chicago	$48.40
*4-in., del'd Chicago	51.40
6-in. and larger, del'd New York	45.20
4-in. del'd New York	48.20
*6-in. and larger, Birmingham	40.00
*4-in. Birmingham	43.00

Class "A" and gas pipe, $3 extra.

*Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $39, Birmingham, and $47.40, delivered Chicago, and 4-in. pipe, $42. Birmingham, and $50.40 a ton, delivered Chicago.

RAILROAD MATERIALS

Rails and Track Supplies

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$36.37½
Angle bars, per 100 lb.	2.55

F.o.b. Code Basing Points

Light rails (from billets) per gross ton	$35.00
Light rails (from rail steel) per gross ton	34.00

	Base per 100 Lbs.
Spikes, 9/16 in. and larger	$2.40
Spikes, ½ in .and smaller	2.40
Tie plates, steel	1.90
Tie plates, Pacific Coast ports	2.00
Track bolts, to steam railroads	3.55
Track bolts, no jobbers, all sizes (per 100 count)	70 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Buffalo, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa.; on spikes alone, Cleveland, Youngstown, Lebanon, Pa., Columbia, Pa., Richmond, Va.

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	70, 10 and 5
Carriage bolts	70, 10 and 5
Lag bolts	70, 10 and 5
Plow bolts, Nos. 1, 2, 3 and 7 heads	70, 10 and 5
Hot-pressed nuts, blank or tapped, square	70, 10 and 5
Hot-pressed nuts, blank or tapped, hexagons	70, 10 and 5
C.p.c. and t. square or hex. nuts, blank or tapped	70, 10 and 5
Semi-finished hexagon nuts, U.S.S. and S.A.E., all sizes to and incl. 1 in. diameter	70, 10 and 5
Larger than 1 in. diameter	70
Stove bolts in packages, Pittsburgh	75
Stove bolts in packages, Chicago	75
Stove bolts in packages, Cleveland	75
Stove bolts in bulk, Pittsburgh	83
Stove bolts in bulk, Chicago	83
Stove bolts in bulk, Cleveland	83
Tire bolts	60 and 5

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.90
F.o.b. Chicago	3.00
F.o.b. Birmingham	3.05

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birm'g'm	70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	85 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	87½
Upset set screw, cut and oval point	80
Milled studs	65 to 65 and 10

Alloy and Stainless Steel

Alloy Steel Ingots

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Uncropped .....$40 per gross ton

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $49 a gross ton.

Alloy Steel Bars

Price del'd Detroit is $52.

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base .....2.45c.
Delivered price at Detroit is .....2.60c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2000 (½ Nickel)	$0.25
2100 (2½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.70
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo. 2.95c. base per lb.

STAINLESS STEEL No. 302

(17 to 19% Cr. 7 to 9% Ni. 0.08 to 0.20% C.)

(Base Prices f.o.b. Pittsburgh)

	Per Lb.
Forging billets	19.55c.
Rerolling slabs	15c.
Bars	23c.
Plates	26c.
Structural shapes	23c.
Sheets	33c.
Hot-rolled strip	20¾c.
Cold-rolled strip	27c.
Drawn wire	23c.

Raw and Semi-Finished Steel

Carbon Steel Rerolling Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.
Uncropped .....$29 per gross ton

Carbon Steel Forging Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Birmingham.
Uncropped .....$31 per gross ton

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.

	Per Gross Ton
Rerolling	$27.00
Forging quality	32.00

Delivered Detroit

Rerolling	$30.00
Forging	35.00

Billets Only F.o.b. Duluth

Rerolling	$29 00
Forging	34.00

Sheet Bars

Fo.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$28.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved	1.70c.
Universal	1.70c.
Sheared	1.70c.

Tube Rounds

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Cleveland	1.85c.
F.o.b. Buffalo	1.90c.
F.o.b. Birmingham	1.95c.

Wire Rods

(Common, base)

	Per Gross Ton
F.o.b. Pittsburgh	$38.00
F.o.b. Cleveland	38.00
F.o.b. Chicago	39.00
F.o.b. Anderson, Ind.	39.00
F.o.b. Youngstown	39.00
F.o.b. Worcester, Mass.	40.00
F.o.b. Birmingham	41.00
F.o.b. San Francisco	47.00
F.o.b. Galveston	44.00

Pig Iron and Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	$19.50	$20.00	$19.00	$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Swedeland, Pa.	19.50	20.00	19.00	20.50
Steelton, Pa.	....	....	19.00	....
Sparrows Point, Md.	19.50	....	19.00	....
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	19.00	18.00	19.00
Buffalo	18.50	19.00	17.50	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	....
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	19.00
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	18.50	18.00	....
Duluth, Minn.	19.00	19.00	....	19.50
Birmingham	14.50	14.50	13.50	19.00
Provo, Utah	17.50	....	17.00	....

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District From Everett, Mass.	$20.00	$20.50	$19.50	$21.00
Brooklyn From East. Pa.	21.9289	22.4289	21.9289	22.9289
Newark or Jersey City, N. J. From East. Pa.	20.9873	21.4873	20.4873	21.9873
Philadelphia From Eastern Pa.	20.3132	20.8132	19.8132	21.3132
Cincinnati From Hamilton, Ohio	19.5807	19.5807	19.0807	20.0807
Canton, Ohio From Cleveland and Youngstown	19.8402	19.8402	19.3402	20.3402
Columbus, Ohio From Hamilton, Ohio	20.64	20.64	....	....
Mansfield, Ohio From Cleveland and Toledo	20.3832	20.3832	....	....
Indianapolis From Hamilton, Ohio	20.9289	20.9289	....	....
South Bend, Ind. From Chicago	20.6935	20.6935	....	....
Milwaukee From Chicago	19.57	19.57	....	....
St. Paul From Duluth	20.94	....	....	....
Davenport, Iowa From Chicago	20.3832	20.3832	....	....
Kansas City From Granite City	21.2178	21.2178	....	....

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y. $23.50

GRAY FORGE PIG IRON

Valley furnace	$18.00
Pittsburgh district furnace	18.00

CHARCOAL PIG IRON

Lake Superior furnace	$21.00
Delivered Chicago	24.2528
Delivered Buffalo	24.57

CANADA

Pig Iron

Per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$21.0
No. 2 fdy., sil. 1.75 to 2.75	20.5
Malleable	21.0

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$22.5
No. 2 fdy., sil. 1.75 to 2.25	22.0
Malleable	22.5
Basic	22.0

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

	Per Gross Ton
Domestic, 80% (carload)	$85.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$26.00
50-ton lots 3-mo. shipment	24.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	136.00

Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
6%	$22.75	12%	$29.25
7%	23.75	13%	30.75
8%	24.75	14%	32.25
9%	25.75	15%	33.75
10%	26.75	16%	35.25
11%	27.75	17%	36.75

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
10%	$27.75	14%	$33.75
11%	28.75	15%	34.75
12%	30.25	16%	36.25
13%	31.75	17%	37.75

Manganese 1½ to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W. del., carloads	$1.35 to $1.45
Ferrotungsten, less carloads	1.45 to 1.55
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr. per lb. contained Cr. delivered, in carloads	10.00c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del. per lb. contained V.	$2.70 to $2.90
Ferrocarbontitanium, 15 to 18% Ti, 6 to 8% C, f.o.b. furnace carload and contract per net ton	$137.50
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	58.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$38.00
Ton lots or less per ton	45.00
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	90.00
2% carbon grade	95.00
1% carbon grade	105.00
Spot prices	$5 a ton higher

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$11.50 to $12.00
No. 2 heavy melting steel	10.00 to 10.50
No. 2 railroad wrought	11.50 to 12.00
Scrap rails	13.00 to 13.50
Rails, 3 ft. and under	13.50 to 14.00
Compressed sheet steel	11.25 to 11.75
Hand bundled sheet steel	10.00 to 10.50
Hvy. steel axle turnings	10.00 to 10.50
Machine shop turnings	8.00 to 8.50
Short shov. turnings	8.00 to 8.50
Short mixed borings and turnings	6.25 to 6.75
Cast iron borings	6.25 to 6.75
Cast iron carwheels	12.00 to 12.50
Heavy breakable cast	11.50 to 12.00
No. 1 cast	13.00 to 13.50
Railr. knuckles and couplers	14.25 to 14.75
Rail, coil and leaf springs	14.25 to 14.75
Rolled steel wheels	14.25 to 14.75
Low phos. billet crops	15.00 to 15.50
Low phos. sheet bar crops	14.25 to 14.75
Low phos. plate scrap	14.00 to 14.50
Low phos. punchings	14.00 to 14.50
Steel car axles	14.25 to 14.75

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$9.75 to $10.00
Automobile hvy. melt. steel	9.00 to 9.50
Shoveling steel	9.75 to 10.00
Hydraulic comp. sheets	8.50 to 9.00
Drop forge flashings	7.50 to 8.00
No. 1 busheling	8.00 to 8.50
Rolled carwheels	11.00 to 11.50
Railroad tires	11.50 to 12.00
Railroad leaf springs	10.50 to 11.00
Axle turnings	8.75 to 9.25
Steel couplers and knuckles	10.75 to 11.25
Coil springs	11.75 to 12.25
Axle turnings (elec. fur.)	9.25 to 9.75
Low phos. punchings	13.00 to 13.50
Low phos. plates, 12 in. and under	13.00 to 13.50
Cast iron borings	5.00 to 5.50
Short shoveling turnings	5.00 to 5.50
Machine shop turnings	4.75 to 5.25
Rerolling rails	10.50 to 11.00
Steel rails, less than 3 ft.	11.50 to 12.00
Steel rails, less than 2 ft.	12.50 to 13.00
Angle bars, steel	12.00 to 12.50
Cast iron carwheels	10.50 to 11.00
Railroad malleable	12.50 to 13.00
Agricultural malleable	9.50 to 10.00

	Per Net Ton
Iron car axles	$13.50 to $14.00
Steel car axles	13.00 to 13.50
No. 1 railroad wrought	7.75 to 8.25
No. 2 railroad wrought	8.25 to 8.75
No. 1 busheling	4.50 to 5.00
Locomotive tires, smooth	10.00 to 10.50
Pipe and flues	5.00 to 5.50
No. 1 machinery cast	9.00 to 9.50
Clean automobile cast	8.50 to 9.00
No 1 railroad cast	8.00 to 8.50
No. 1 agricultural cast	8.00 to 8.50
Stove plate	6.00 to 6.50
Grate bars	5.50 to 6.00
Brake shoes	6.00 to 6.50

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	*$9.50 to $10.50
No. 2 heavy melting steel	*8.50 to 9.50
No. 1 railroad wrought	10.00 to 10.50
Bundled sheets	9.50 to 10.00
Hydraulic compressed, new	9.50 to 10.00
Hydraulic compressed, old	7.00 to 7.50
Machine shop turnings	5.50 to 6.00
Heavy axle turnings	8.50 to 9.00
Cast borings	5.00 to 5.50
Stove plate (steel works)	8.00 to 8.25
Heavy breakable cast	10.50 to 11.00
No. 1 low phos. heavy	13.75 to 14.25
Couplers and knuckles	13.50 to 14.00
Rolled steel wheels	13.50 to 14.00
No. 1 blast furnace	4.75 to 5.00
Spec. iron and steel pipe	8.00 to 8.50
Shafting	17.00
Steel axles	16.00
No. 1 forge fire	9.50 to 10.00
Cast iron carwheels	11.00 to 11.50
No. 1 cast	11.00 to 11.50
Cast borings (chem.)	12.00 to 14.00
Steel rails for rolling	12.00 to 12.50

* Brokers' buying price for export.

CINCINNATI

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$7.75 to $8.25
No. 2 heavy melting steel	6.25 to 6.75
Scrap rails for melting	7.75 to 8.25
Loose sheet clippings	4.25 to 4.75
Bundled sheets	5.75 to 6.25
Cast iron borings	4.25 to 4.75
Machine shop turnings	4.25 to 4.75
No. 1 busheling	5.75 to 6.25
No. 2 busheling	2.50 to 3.00
Rails for rolling	8.75 to 9.25
No. 1 locomotive tires	7.00 to 7.50
Short rails	11.25 to 11.75
Cast iron carwheels	7.75 to 8.25
No. 1 machinery cast	9.00 to 9.50
No. 1 railroad cast	8.25 to 8.75
Burnt cast	5.75 to 6.25
Stove plate	5.75 to 6.25
Agricultural malleable	7.75 to 8.25
Railroad malleable	8.75 to 9.25

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$10.00 to $10.50
No. 2 heavy melting steel	9.50 to 10.00
Compressed sheet steel	9.75 to 10.25
Light bundled sheet stampings	8.00 to 8.50
Drop forge flashings	9.50 to 10.00
Machine shop turnings	6.25 to 6.75
Short shoveling turnings	6.50 to 7.00
No. 1 busheling	9.50 to 10.00
Steel axle turnings	9.50 to 10.00
Low phos. billet crops	14.00 to 14.50
Cast iron borings	6.50 to 7.00
Mixed borings and short turnings	6.50 to 7.00
No. 2 busheling	6.50 to 7.00
No. 1 cast	11.50 to 12.00
Railroad grate bars	7.00 to 7.50
Stove plate	7.50 to 8.00
Rails under 3 ft.	14.00 to 14.50
Rails for rolling	15.50 to 18.00
Railroad malleable	13.50 to 14.00
Cast iron carwheels	10.75 to 11.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$11.00
No. 2 heavy melting scrap	10.00
Scrap rails	11.00
New hydraul. comp. sheets	10.00
Old hydraul. comp. sheets	9.00
Drop forge flashings	10.00
No. 1 busheling	10.00
Hvy. steel axle turnings	$8.00 to 8.50
Machine shop turnings	4.50 to 5.00
Knuckles and couplers	11.50 to 12.00
Coil and leaf springs	11.50 to 12.00
Rolled steel wheels	11.50 to 12.00
Low phos. billet crops	12.00 to 12.50
Short shov. steel turnings	6.00 to 6.50
Short mixed borings and turnings	6.00 to 6.50
Cast iron borings	6.00 to 6.50
No. 2 busheling	6.50
Steel car axles	11.50 to 12.00
Iron axles	11.50 to 12.00
No. 1 machinery cast	11.50 to 12.50
No. 1 cupola cast	10.50 to 11.00
Stove plate	9.00 to 9.50
Steel rails, 3 ft. and under	12.50 to 13.00
Cast iron carwheels	11.00 to 11.50
Industrial malleable	12.00 to 13.00
Railroad malleable	12.00 to 13.00
Chemical borings	8.00 to 8.50

BOSTON

Dealers' buying prices per gross ton:

*No. 1 heavy melting steel	$8.50
No. 1 heavy melting steel	$6.15 to 6.65
*Scrap T rails	8.50 to 8.75
Scrap rails	6.40 to 6.65
*No. 2 steel	7.50
No. 2 steel	5.15 to 5.65
Breakable cast	5.00 to 5.50
Machine shop turnings	2.40 to 2.50
*Machine shop turnings (short)	4.25 to 4.50
Bundled skeleton, long	5.05 to 5.30
Forge flashings	5.00 to 5.50
Shafting	11.75 to 12.00
Steel car axles	11.50 to 12.00
Cast iron borings, chemical	6.50 to 7.00
*Stove plate	6.25 to 6.50

Per gross ton delivered consumers' yards:

Textile cast	$9.00 to $9.50
No. 1 machinery cast	9.00 to 9.50
Stove plate	6.00 to 6.50
Railroad malleable	11.00 to 11.50

* Delivered local army base.

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	*$7.00 to †$8.50
No. 2 heavy melting steel	*5.50 to †7.50
Heavy breakable cast	6.25 to 6.75
No. 1 machinery cast	7.00 to 7.50
No. 2 cast	†6.25
Stove plate	†6.25
Steel car axles	13.50 to 14.00
No. 1 railroad wrought	7.00 to 7.50
No. 1 yard wrought, long	6.00 to 6.50
Spec. iron and steel pipe	4.50 to 5.00
Forge fire	5.50 to 6.00
Rails for rolling	8.50 to 9.00
Short shoveling turnings	2.00 to 2.50
Machine shop turnings	2.00 to 2.50
Cast borings	3.50 to 3.75
No. 1 blast furnace	2.00 to 2.50
Cast borings (chemical)	11.00 to 11.50
Unprepared yard iron and steel	4.00 to 4.50

Per gross ton, delivered local foundries:

No. 1 machinery cast	$10.00
No. 1 hvy. cast (cupola size)	9.00
No. 2 cast	7.50

* For direct car loading only.
† Loading on barge.

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	$9.00 to $9.50
Scrap steel rails	10.00 to 10.50
Short shoveling turnings	7.00
Stove plates	7.00
Steel axles	11.50
Iron axles	11.50
No. 1 railroad wrought	7.00
Rails for rolling	12.50
No. 1 cast	9.50 to 10.00
Tramcar wheels	10.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$8.75 to $9.25
No. 1 heavy melting	8.25 to 8.75
No. 2 heavy melting	7.50 to 8.00
No. 1 locomotive tires	9.75 to 10.25
Misc. stand-sec. rails	9.75 to 10.25
Railroad springs	11.00 to 11.50
Bundled sheets	6.00 to 6.50
No. 2 railroad wrought	8.25 to 8.75
No. 1 busheling	5.00 to 5.50
Cast iron borings and shoveling turnings	3.00 to 3.50
Rails for rolling	10.00 to 10.50
Machine shop turnings	2.75 to 3.25
Heavy turnings	5.50 to 6.00
Steel car axles	12.50 to 13.00
Iron car axles	15.00 to 16.00
No. 1 railroad wrought	6.00 to 6.50
Steel rails less than 3 ft.	11.50 to 12.00
Steel angle bars	9.50 to 10.00
Cast iron carwheels	8.00 to 8.50
No. 1 machinery cast	8.50 to 9.00
Railroad malleable	10.50 to 11.00
No. 1 railroad cast	8.00 to 8.50
Stove plate	6.50 to 7.00
Agricult. malleable	8.50 to 9.00

DETROIT

Dealers' buying prices per gross ton:

Heavy melting steel	$7.50 to $8.00
Borings and short turnings	4.25 to 4.75
Long turnings	$4.00 to $4.50
No. 1 machinery cast	11.00 to 11.50
Automotive cast	11.25 to 11.75
Hydraul. comp. sheets	8.25 to 8.75
Stove plate	6.50 to 7.00
New factory busheling	6.75 to 7.25
Old No. 2 busheling	3.75 to 4.25
Sheet clippings	5.00 to 5.50
Flashings	7.50 to 8.00
Low phos. plate scrap	7.75 to 8.25

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$7.00	$7.00
Rails scrap	8.00	8.00
Machine shop turnings	3.00	3.00
Boiler plate	4.50	4.50
Heavy axle turnings	4.50	4.00
Cast borings	4.00	3.50
Steel borings	2.00	2.00
Wrought pipe	3.50	3.50
Steel axles	7.00	8.00
Axles, wrought iron	7.00	8.00
No. 1 machinery cast	9.00	9.00
Stove plate	5.50	5.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

Lake Superior Ores

Delivered Lower Lake Ports

	Per Gross Ton
Old range, Bessemer, 51.50% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore

C.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algeria	9.50c.
Iron, low phos., Swedish, average 68½% iron	9.50c.
Iron, basic or foundry, Swedish, aver. 65% iron	9c.
Iron, basic or foundry, Russian, aver. 65% iron	9c.
Manganese, Caucasian, washed 52%	26c.
Manganese, African, Indian, 44-48%	21c
Manganese, African, Indian, 49-51%	24c.
Manganese, Brazilian, 46 to 48½%	20c.

	Per Net Ton Unit
Tungsten, Chinese, wolframite, duty paid, delivered*	$17.50 to $18.50
Tungsten, domestic, scheelite, delivered†	17.00

	Per Gross Ton
Chrome, 45%, Cr_2O_3, crude, c.i.f. Atlantic Seaboard	$17.00
Chrome, 48%, Cr_2O_3, c.i.f. Atlantic Seaboard	20.00

* Quotations nominal in absence of sales.
† Nominal; no supplies available.

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines for all-rail shipment	$13.00
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	16.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	14.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	19.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville	
Prompt	$3.50 to $3.75
Foundry, f.o.b. Connellsville	
Prompt	4.00 to 5.10
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching districts	9.25
Foundry, by-product, New England, delivered	11.00
Foundry by-product, Newark or Jersey City, cel'd	9.24 to 9.72
Foundry, by-product, Phila.	9.03
Foundry, by-product, Cleveland, delivered	$9.25
Foundry, Birmingham	6.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.60 to $1.80
Mine run gas coal, f.o.b. W. Pa. mines	1.80 to 2.10
Gas coal, f.o.b. Pa. mines	2.00 to 2.50
Mine run gas coal, f.o.b. Pa. mines	1.90 to 2.10
Steam slack, f.o.b. Pa. mines	1.25 to 1.50
Gas slack, f.o.b. W. Pa. mines	1.35 to 1.60

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c
No. 4 industrial	3.50c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c
No. 4 industrial	3.50c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.88c
No. 5 industrial fuel oil	3.38c
Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.50c.
No. 4 industrial	5.25c.
No. 5 industrial	4.25c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works: High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$45.00	$40.00
Maryland	45.00	40.00
New Jersey	55.00	43.00
Ohio	45.00	40.00
Kentucky	45.00	40.00
Missouri	45.00	40.00
Illinois	45.00	40.00
Ground fire clay, per ton	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$45.00
Chicago District	54.00
Birmingham	55.00
Silica clay, per net ton	8.00

Chrome Brick

	Per Net Ton
Standard, f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	$45.00
Chemically Bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	42.50

Magnesite Brick

	Per Net Ton
Standard, f.o.b. Baltimore and Chester, Pa.	$65.00
Chemically Bonded, f.o.b. Baltimore	55.00

Grain Magnesite

	Per Net Ton
Imported, f.o.b. Baltimore and Chester, Pa.	$45.00
Domestic, f.o.b. Baltimore and Chester	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

Warehouse Prices for Steel Products

PITTSBURGH

Base per Lb.

Plates	3.15c.
Structural shapes	3.15c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.90c.
Cold-finished and screw stock:	
Rounds and hexagons	3.20c.
Squares and flats	3.20c.
Hoops and bands under ¼ in.	3.20c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.30c.
Galv. sheets (No. 24), 25 or more bundles	3.95c.
Hot-rolled sheets (No. 10)	2.95c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.69
Spikes, large	2.90c.
Track bolts, all sizes, per 100 count, 65 per cent off list.	
Machine bolts, 100 counts, 65 per cent off list.	
Carriage bolts, 100 count, 65 per cent off list.	
Nuts, all styles, 100 count, 65 per cent off list.	
Large rivets, base per 100 lb.	$3.50
Wire, black, soft ann'l'd, base per 100 lb.	*2.70
Wire, galv. soft, base per 100 lb.	*2.925
Common wire nails, per keg	*2.834
Cement coated nails, per keg	*2.834

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lb.

*Delivered in Pittsburgh switching district.

CHICAGO

Base per Lb.

Plates and structural shapes	3.20c.
Soft steel bars	2.95c.
Cold-fin. steel bars:	
Rounds and hexagons	3.35c.
Flats and squares	3.35c.
Hot-rolled strip	2.80c.
Hot-rolled annealed sheets (No. 24)	3.85c.
Galv. sheets (No. 24)	4.55c.
Hot-rolled sheets (No. 10)	3.05c.
Spikes (keg lots)	3.50c.
Track bolts (keg lots)	4.65c.
Rivets, structural (keg lots)	3.65c.
Rivets, boiler (keg lots)	3.75c.

Per Cent Off List

Machine bolts	*70
Carriage bolts	*70
Lag screws	*70
Hot-pressed nuts, sq. tap. or	
Hot-pressed nuts, sq. tap or blank	*70
Hot-pressed nuts, hex. tap or	
Hot-pressed nuts, hex. tap or blank	*70
Hex. head cap screws	80
Cut point set screws	70 and 10
Flat head bright wood screws	37½ and 10
Spring cotters	50
Store bolts in full packages	70
Rd. hd. tank rivets, 7/16 in. and smaller	57½
Wrought washers	$4.50 off list
Black ann'l'd wire per 100 lb.	$3.85
Com. wire nails, base per keg	2.95†
Cement c't'd nails, base per keg	2.95†

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

*These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 65 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b., Chicago, with full or partial freight allowed up to 50c. per 100 lb.

†Prices for city and suburbs only.

NEW YORK

Base per Lb.

Plates, ¼ in. and heavier	3.40c.
Structural shapes	3.37c.
Soft steel bars, small shapes	3.26c.
Iron bars	3.26c.
Iron bars, swed. charcoal	6.50c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.81c.
Flats and squares	4.31c.
Cold-rolled; strip, soft and quarter hard	3.36c.
Hoops	3.56c.
Bands	3.56c.
Hot-rolled sheet (No. 10)	3.31c.
Hot-rolled ann'l'd sheets (No. 24*)	3.89c.
Galvanized sheets (No. 24*)	4.50c.
Long terne sheets (No. 24)	5.20c.
Standard tool steel	11.00c.
Wire, black annealed (No. 10)	3.40c.
Wire, galv. (No. 10)	3.75c.
Tire steel, 1 x ½ in. and larger	3.65c.
Open hearth spring steel	4.00c. to 10.00c.
Common wire nails, base, per keg	$3.21

Per Cent Off List

Machine bolts, cut thread: All diameters	65 and 10
Carriage bolts, cut thread: All diameters	65 and 10

Per 100 Ft.

Boiler tubes: Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

Base per Lb.

Plates and struc. shapes	3.44c.
Bars, soft steel or iron	3.19c.
Cold-fin. rounds, shafting, screw stocks	3.74c.
Hot-rolled annealed sheets (No. 24)	4.09c.
Galv. sheets (No. 24)	4.64c.
Hot-rolled sheets (No. 10)	3.29c.
Black corrug. sheets (No. 24)	4.09c.
*Galv. corrug. sheets	4.64c.
Structural rivets	3.99c.
Boiler rivets	4.09c.

Per Cent Off List

Tank rivets, 7/16 in. and smaller	55
Machine and cerriage bolts, lag screws fittings up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts: All quantities	70

*No. 26 and lighter take special prices.

PHILADELPHIA

Base per Lb.

*Plates, ¼-in. and heavier	2.98c.
*Structural shapes	2.98c.
*Soft steel bars, small shapes, iron bars (except bands)	2.93c.
‡Reinforc. steel bars, sq. twisted and deformed	2.96c.
Cold-finished steel bars	3.61c.
*Steel hoops	3.43c.
*Steel bands, No. 12 and 3/16 in., incl.	3.18c.
Spring steel	5.00c.
†Hot-rolled anneal. sheets (No. 24)	3.65c.
‡Galvanized sheets (No. 24)	4.30c.
*Hot-rolled annealed sheets (No. 10	3.08c.
Diam. pat. floor plates, ¼ in.	4.95c.
Swedish iron bars	6.25c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

‡For less than 2000 lb.

CLEVELAND

Base per Lb.

Plates and struc. shapes	3.31c.
Soft steel bars	2.95c.
Reinforc. steel bars	2.10c.
Cold-finished steel bars	3.25c.
Flat-rolled steel under ¼ in.	3.36c.
Cold-finished strip	†3.00c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.61c.
Hot-rolled sheets (No. 10)	3.11c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.56c.
Black ann'l'd wire, per 100 lb.	$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.40

†Outside delivery 10c. less.

CINCINNATI

Base per Lb.

Plates and struc. shapes	3.42c.
Bars, soft steel or iron	3.17c.
New billet reinforc. bars	3.25c.
Rail steel reinforc. bars	3.25c.
Hoops and bands, 3/16 in. and lighter	3.47c.
Cold-finished bars	3.57c.
Hot-rolled annealed sheets (No. 24)	4.02c.
Galv. sheets (No. 24)	4.72c.
Hot-rolled sheets (No. 10)	3.22c.
Structural rivets	4.35c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$2.88
Com. wire nails, base per keg:	
Any quantity less than carload	3.04
Cement c't'd nails, base 100-lb. keg	3.50
Chain, 1-in., per 100 lb.	8.35

Net per 100 Ft.

Seamless steel boiler tubes, 2-in.	$21.67
4-in.	51.19
Lap-welded steel boiler tubes, 2-in.	20.62
4-in.	48.19

BUFFALO

Base per Lb.

Plates	3.37c.
Struc. shapes	3.25c.
Soft. steel bars	3.00c.
Reinforcing bars	2.60c.
Cold-fin. flats and sq.	3.55c.
Round and hex.	3.55c.
Cold-rolled strip steel	3.19c.
Hot-rolled annealed sheets (No. 24)	4.05c.
Heavy hot-rolled sheets, 3/16 in., 24 to 48 in. wide	3.62c.
Galv. sheets (No. 24)	4.70c.
Bands	3.42c.
Hoops	3.42c.
Hot-rolled unannealed sheets	3.17c.
Com. wire nails, base per keg	$3.35
Black wire, base per 100 lb.	3.55

BOSTON

Base per Lb.

Reams, channels, angles, tees, zees	3.54c.
H beams and shapes	3.54c.
Plates—sheered, tank and univ. mill, ¾ in. thick and heavier	3.56c.
Floor plates, diamond pattern	5.36c.
Bar and bar shapes (mild steel)	3.35c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.65c. to 4.65c.
Half rounds, half ovals, ovals and bevels	4.60c.
Tire steel	4.60c.
Cold-rolled strip steel	3.245c.
Cold-finished rounds, squares and hexagons	3.90c.
Cold-finished flats	3.75c.
Blue annealed sheets, No. 10 ga.	3.65c.
One pass cold-rolled sheets No. 24 ga.	4.20c.
Galvanized steel sheets, No. 24 ga.	4.90c.
Lead coated sheets, No. 24 ga.	5.85c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

Base per Lb.

Soft steel bars	3.04c.
Structural shapes	3.42c.
Plates	3.42c.
Floor plates	5.17c.
Hot-rolled annealed sheets (No. 24)	3.94c.
Hot-rolled sheets (No. 10)	3.14c.
Galvanized sheets (No. 24)	4.72c.
Bands	3.39c.
Hoops	3.39c.
Cold-finished bars	3.49c.
Cold-rolled strip	3.18c.
Hot-rolled alloy steel (S.A.E. 3100 Series)	5.29c.*
Bolts and nuts	70 and 5 per cent off list

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials.

* Price applies to 1,000 lb. and over.

MILWAUKEE

Base per Lb.

Plates and structural shapes	3.31c.
Soft steel bars	3.06c.
Hot-rolled strip	3.41c.
Hot-rolled sheets (No. 10)	3.16c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.66c.
Cold-finished steel bars	3.61c.
Cold-rolled strip	3.30c.
Structural rivets (keg lots)	3.86c.
Boiler rivets (keg lots)	3.96c.
Track spikes (keg lots)	3.71c.
Track bolts (keg lots)	4.86c.
Black annealed wire	3.10c.
Com. wire nails	2.90c.
Cement coated nails	2.90c.

Per Cent Off List

Machine bolts	70
Carriage bolts	70
Hot-pressed nuts, sq. and hex., tapped or blank (keg lots)	70

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on order of 400 to 3499 lb. On cold-finished bars the prices are for orders of 300 to 499 lb.

ST. PAUL

Base per Lb.

Mild steel bars	3.20c.
Structural shapes	3.45c.
Plates	3.45c.
Cold-finished bars	3.87c.
Bands and hoops	3.55c.
Hot-rolled annealed sheets, No. 24	3.90c.
Galvanized sheets, No. 24	4.50c.
Cold-rolled sheets, No. 20	4.95c.

On mild steel bars, shapes, plates and hoops and bands the base applies on 400 to 14,999 lb. On cold-finished bars, hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over.

PACIFIC COAST

Base per Lb.

	San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.55c.	3.60c.	3.55c.
Shapes, standard	3.55c.	3.60c.	3.55c.
Soft steel bars	3.60c.	3.60c.	3.60c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.45c.	2.45c.	2.45c.
Hot-rolled annealed sheets (No. 24)	4.40c.	4.35c.	4.40c.
Hot-rolled sheets (No. 10)	3.75c.	3.70c.	3.75c.
Galv. sheets (No. 24)	5.00c.	4.95c.	5.00c.
Cold finished steel: Rounds	5.95c.	5.85c.	6.00c.
Squares and hexagons	7.20c.	7.10c.	7.25c.
Flats	7.70c.	7.60c.	8.25c.
Common wire nails —base per keg less carload	$3.30	$3.40	$3.30

All items subject to differentials for quantity.

TOOL STEEL

Prices are same for warehouse distribution at all points on or East of Mississippi River. West of Mississippi quotations are 1c. a lb. higher.

Base per Lb.

High speed	57c.
High carbon chrome	37c.
Oil hardening	22c.
Extra	17c.
Regular	14c.

Weekly Indications of Steel Activity

From THE IRON AGE

	June 11, 1935	June 4, 1935	May 14, 1935	June 12, 1934	Average, Year to Date 1935	Average, Year to Date 1934
Steel ingot operations—Per cent of capacity	39.5	41.5	44.5	61.0	47.1	47.9

	Week Ended June 11, 1935	June 4, 1935	May 14, 1935	June 12, 1934	Year to Date 1935	Year to Date 1934
Fabricated structural steel awards	12,915	5,700	6,700	16,200	302,353	389,620
Fabricated plate awards	2,800	5,600	1,495	3,220	50,467	54,372
Sheet steel piling awards	0	0	1,200	2,420	22,145	23,240
Reinforcing bar awards	1,980	2,455	1,500	1,700	102,205	95,420

Philadelphia Sellers Resist Pressure for Lower Prices

Small Buyers Again in the Market for Immediate Requirements — Large Users Continue To Delay Ordering

PHILADELPHIA, June 11.—With the passing of the steel code, steel sellers in this area were at first doubtful that the code price structure could be maintained. Subsequent developments, however, have strengthened the view that prices will be held at code levels for some time to come. There are rumors of minor price concessions here and there, but these are attributed by mills to a whispering campaign designed to inject an element of doubt as to the stability of the present market.

This district continues to run contrary to the rest of the country. Whereas business was good elsewhere in the first quarter, the activity of this area failed to show any strength. And now when operations over the country are declining slowly, this district continues to operate at an unchanged but low rate. The Phoenixville producer has cut out one furnace, but slight rises in activity in other mills have served to maintain the district rate at 32 per cent of capacity.

Inasmuch as this district has a large percentage of structural steel, bar and plate capacity, the current shortage of highway construction work is the major factor keeping district operations at a skeleton level. Indications are that these lines will not pick up to any extent in the early fall unless the expenditure of public works money is liberalized in the near future.

Pig Iron

Small-lot ordering is again the feature of this market, following a short let-up in business after the Supreme Court's invalidation of NRA. There are, however, no large inquiries in the market, as the larger buyers are naturally enough delaying their ordering in view of the uncertain condition of the market. Despite vague rumors of price concessions, there are no known instances of price shading. Occasional carlots of Russian iron are being delivered to nearby foundries which regard the lower price as sufficient inducement to try it out.

Warehouse Business

Most warehouses have experienced a slight decline in demand during the latter part of May and so far in June. This easiness, however, is considered as having no significance. Current buying is not confined to any one line, as it is widespread and miscellaneous. Prices are quotably unchanged and steady. All plants are maintaining NRA wages and hours, and insist that no change will be made in this practice in the near future.

Sheets and Strip

With automobile assemblies well past the peak level, local fabricators supplying this industry are purchasing little or no steel. Makers of radio and refrigerator parts, however, report sustained demand. Likewise, fair quantities of stainless are being delivered to plants fabricating Navy orders. As reported last week, the E. G. Budd Mfg. Co. may soon purchase 35,000 to 42,000 tons of heavy sheets for fabricating its recently secured Chevrolet frame order. No decision has yet been reached as to whether this material will be bought in sheet form or already blanked and ready for stamping. The frames will be assembled by welding and riveting, and will be shipped to automobile assembly plants along the Eastern coast and also by water to plants on the Pacific Coast.

Bars, Plates and Shapes

District mills are now somewhat in doubt as to the receipt of expected public works tonnages in the early fall in view of the continued delay at Washington in the allotment of Federal funds. And unless support comes from this direction, the fall period is none too encouraging for nearby plate and structural mills. Only routine railroad demands are in sight and private construction and shipbuilding show no indication of changing from their present inactive state.

There was no bar letting of over 100 tons during the week, and awards of shapes were confined to 100 tons for a duPont building at Belle, W. Va., to McClintic-Marshall Corpn., and 200 tons for a Plymouth, Pa., bridge to American Bridge Co. The only new inquiry calls for 150 tons for an Owens-Illinois Glass Co. building at Bridgetown, Pa., on which bids are due June 14. In the absence of any significant plate business, there has been very little agitation for shading of prices. Fabricating charges on shapes continue at a very low level, with no indication of strength, but quotations on shapes are steady and unchanged from code levels.

Imports

The following iron and steel imports were received here last week: 1364 tons of pig iron from the Netherlands and 997 tons of the same product from British India; 800 tons of ferromanganese, 13 tons of structural shapes and 8 tons of steel bands from Germany; 106 tons of chrome ore from South Africa; 103 tons of sponge iron and 22 tons of steel bars from Sweden, and 3 tons of steel bars from Belgium.

Scrap

This market is mirroring the general steel market. Business is lethargic, with consumers displaying a waiting attitude and sellers holding prices at unchanged levels with no signs of weakness. Most district mills are taking occasional shipments on old contracts but refuse to translate their general interest into actual orders. Mill inventories are lower than usual; such a condition is healthy for the scrap trade but might be disadvantageous to the mills if concerted buying should develop.

The export market continues strong, both on the buying and selling ends. There is plenty of scrap at Port Richmond to meet scheduled boats, but dealer deliveries of No. 1 and No. 2 to that point have dropped off materially in the past few weeks. The heavy May shipments have apparently depleted the supply of ready scrap in this area for the time being. Occasional lots of No. 1 and No. 2 steels are again being bought at Baltimore for export.

The class of 1935 of the United States Military Academy, West Point, N. Y., visited the Watervliet, N. Y., plant of the Ludlum Steel Co., June 3, to view manufacturing operations of a steel plant devoted to the manufacture of high speed tool steels, stainless steels and other alloys where such manufacture is based entirely on electric furnace production.

Production Falls Two Points To 43 Per Cent at Cleveland

Automotive Demand Undergoes Seasonal Decline—Institute Stand Has Had Salutary Effect On Market Sentiment—Scrap Weakens

CLEVELAND, June 11.—Ingot output in the Cleveland-Lorain territory dropped two points to 43 per cent of capacity this week, one open-hearth being taken off in Lorain.

A slowing down in the demand for finished steel from the automotive industry, combined with a seasonal decline in orders from some other sources, resulted in a further tapering off in business during the week. Orders from the automotive field are growing smaller as the end of the manufacture of present models by some makers is drawing near, and orders from this source are mostly to round out present stocks. New purchases have been made by the local Fisher Body plant for making Chevrolet bodies, but these were only to level off inventories. Releases to some of the Cleveland plants making automobile parts have been curtailed.

Miscellaneous orders are light and for small lots. Consumers are ordering only for immediate needs and stocks are being reduced to a minimum.

The determination of the steel industry to adhere to code provisions, as pledged by the American Iron and Steel Institute, has had a salutary effect in that fear that an unstable price situation would develop has disappeared. Consequently consumers are showing less hesitancy about placing orders for material they actually need than a week ago. Many consumers have urged producers to hold to present price levels. The Akron - Canton - Youngstown Railroad has placed 8500 tons of rails, and the Wheeling & Lake Erie, 1100 tons. Relocation of the tracks of the Wheeling & Lake Erie, Baltimore & Ohio, Pennsylvania, and Erie railroads in the Muskingum Conservancy district will require approximately 10,000 tons of rails, some of which may not be purchased until late in the year. Relocation of Wheeling & Lake Erie tracks calls for 4000 tons.

Pig Iron

Consumers are buying only for immediate needs and new demand is limited to one or two carlot orders. Regular base quotations are being adhered to and there is no pressure from consumers for concessions. Specifications have tapered off moderately from miscellaneous sources, as well as from automotive foundries, and shipments declined 10 per cent during the first 10 days of June as compared with the corresponding period in May.

Sheets

New demand is still showing a downward tendency, which is due both to slowing down of orders from manufacturers of automobiles and household equipment and to some doubt in consumers' minds as to whether prices will be maintained without code support. Small-lot orders are coming from automobile manufacturers to fill in stocks, nearly all for delivery before June 30. Whatever pressure there is for lower prices, it is expected to come from automobile manufacturers, but not until they are ready to buy substantial lots for the manufacture of new models. Quite a few consumers in other fields have urged producers to adhere to the present prices.

Strip Steel

While some fair-sized orders for hot strip are being placed by non-integrated cold rolling mills, the aggregate volume of business is rather light and some of the mills have little unfilled tonnage on their books. New orders from automobile parts makers have declined sharply. Some of these evidently have been making parts faster than they were wanted in production, resulting in an accumulation of parts in automobile assembly departments. No concessions from regular quotations are reported.

Iron Ore

Open market sales have been light since the reestablishment of prices for the season, and not much activity is looked for before fall. Receipts at Lake Erie docks during May were 2,208,349 tons as compared with 1,467,591 tons during the same month last year. Receipts at these docks until June 1 were 2,327,232 tons as against 1,467,591 tons during the same period a year ago. Shipments from Lake Erie docks in May were 1,665,969 tons as against 1,264,446 tons in the corresponding month last year, and shipments until June 1 were 2,139,970 tons as against 1,680,671 tons up to June 1 in 1934. Ports other than those on Lake Erie received 1,020,354 tons during May as against 682,743 tons during May last year, and up to June 1 received 1,170,440 tons as against 682,743 tons up to June 1 last year. Dock balance at Lake Erie ports June 1 was 4,121,841 tons as against 4,373,795 tons on June 1 last year.

Bolts and Nuts

New demand has fallen off this month. Some manufacturers are allowing an extra 10 point discount to jobbers for car lots, and this is expected to eliminate some of the price irregularities that have prevailed recently.

Bars, Plates and Shapes

Muskingum Conservancy district projects involving several thousand tons of structural shapes, reinforcing bars and rails for which bids were to be taken in the next few days have been postponed from two to three weeks. New dates set for receiving bids range from June 25 until July 12. George A. Fuller Co. has been awarded the contract for the Cedar-Central Federal housing project, Cleveland, requiring 1037 tons of reinforcing bars and 250 tons of lintels. Awards and inquiry in the construction field are very light. Grade crossing elimination work in this territory is expected to take a fair tonnage during the next few months. Railroads have plans ready and are now awaiting the decision of the Government as to what projects shall be financed by Federal funds. Demand for merchant bars has fallen off considerably.

Scrap

The market has a weaker tone, although local prices are unchanged. Youngstown dealers purchased the No. 1 railroad steel offered last week by the New York Central Railroad at a reported price of $11.75 and are paying $11.50 for the same grade of material in other than railroad scrap. Additional restrictions on shipments have been put in effect in the Youngstown district. June production of blast furnace scrap offered by Michigan automobile companies was sold in the Pittsburgh district. There is no new consumer buying.

Output Is Off At Buffalo

BUFFALO, June 11. — Open-hearth operations have been scaled down through the discontinuance of two active units at Republic Steel Corpn. Three open-hearths are now operating at this plant. The Lackawanna plant of Bethlehem continues to operate nine and Wickwire-Spencer, one. The Seneca sheet division of Bethlehem is on a 70 per cent basis.

Bids are in for two grade crossing jobs, one for the Baltimore & Ohio at Mumford, N. Y., which will require 125 tons, and one for the Erie at William Street, Buffalo, to require 250 tons of reinforcing bars. Large structural lettings are absent from the week's activities, but there has been a considerable volume of small business, ranging from two or three tons up to 50, 60 and 70 tons.

The pig iron situation, according to producers, is reassuring. There has been no blanket buying, but sellers have booked some substantial tonnages, which have tended to offset the curtailment of activity that set in after recent changes at Washington. No attempt has been made on the part of buyers to scale down the regular price.

Scrap sales have been entirely negligible. The mills are entirely out of the market. Though sales of No. 1 could probably be made at $10.50, dealers are not anxious to sell. Dealers, in fact, are offering that much for scrap at the present time, being convinced that prices are going higher by the fall.

St. Louis Post Office Bids Rejected

ST. LOUIS, June 11. — Bids on the superstructure of the St. Louis Post Office, which would have required approximately 7000 tons of structural steel and 1500 tons of reinforcing bars, have been rejected, following a conference of Senators Clark and Truman of Missouri with officials of the Treasury Department at Washington regarding the use of Missouri marble in preference to Indiana stone. The Great Lakes Construction Co. was the low bidder on the general contract, and Alvey-Ferguson Co., Cincinnati, on the mail-handling equipment, which would have required 350 tons of structural shapes, plates and bars.

Buyers of finished steel still have a hesitant attitude, waiting to see what is going to happen before making commitments for any material except that which is required for immediate consumption or resale. There has been no disposition to break prices. A slight increase has been reported in the movement of barbed wire, and it is stated that the market on this item has been upset by the action of a Chicago jobber. Galvanized sheets also are moving a little better. The War Department has approved plans for a second Lakes-of-the-Ozarks bridge, tentatively designed to require approximately 3000 tons of structural steel, but it is understood that it will be some time before bids will be asked.

Third quarter contracts for pig iron are said to be rather light, and buying continues at a fair rate for immediate needs.

Prices of scrap are unchanged, and there was no buying by the mills.

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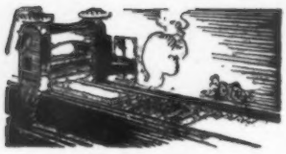
Steel Market Remains Steady at New York



Volume of Spot Business Shows Little Recession Though Forward Covering Is Still Being Held in Abeyance

NEW YORK, June 11.—Steel bookings are light but are again almost on a par with what they were prior to the first reaction to the Supreme Court's decision invalidating the NRA. There is practically no contracting, but, on the other hand, there have been virtually no concellations or suspensions attributable to expectations of lower prices. Shipments against standing commitments are moving in substantially unchanged volume and new orders are uniformly for prompt delivery.

The announced attitude of steel producers regarding adherence to code wage standards and commercial practices has had a salutary effect. It is realized that a breakdown of prices and wages at this time would be cited by the Administration as proving the need for a restoration of Government control on an even more extensive basis than under the NRA. Responsible purchasing executives, therefore, are disposed to favor a continuance of stability in the iron and steel market.

Nevertheless, forward buying is still being held in abeyance awaiting developments. Thus far, no deviations from established base prices have been reported in this market.

Releases of tin plate continue to lag, and, as a result, mill warehouses are crowded with undelivered material. While there has been much more precipitation this year than last, the season has been backward so far as temperatures are concerned and as a consequence the canning packs are light. Sheet and strip demand is unusually light. Construction work has been delayed by the uncertainties growing out of the Supreme Court's decision in the Schechter case. The feeling persists, however, that the volume of business in the last half of the year will show a marked improvement, especially if Congress adjourns in the near future and pending radical legislation is sidetracked.

Bids on the Manhattan approach to the Midtown Tunnel, requiring 5000 tons, were postponed until June 13. New York State will take bids June 17 on 700 tons of sheets for automobile license tag stock. Alco Products, Inc., has been awarded the fabricating contract for a Russian refinery to cost $1,200,000. The tonnage requirements are not yet known.

Bids will be taken June 27 on the Bronx approach to the Triborough bridge, New York (contract No. 38), requiring 10,000 tons of structural steel. Tenders will be received June 17 on pier reconstruction for this bridge calling for 150 tons of structural steel.

Pig Iron

Practically all foundries continue to purchase only the iron needed for immediate melting. Naturally enough there is no tendency to cover forward requirements as there is no indication of a price rise and, on the contrary, most consumers believe that some break may occur in the market. Total bookings of all sellers last week amounted to 1150 tons, as compared with 1450 tons in the preceding week and 1400 tons sold in the period two weeks ago. A total of about 2000 tons of sand and machine cast foundry iron has now been delivered from Russia to Newark, N. J., and Providence, R. I. About half of this tonnage has already been sold, and small-lot orders are coming in at a fair rate from foundries interested in testing its quality. Like Dutch iron, the Soviet iron is being sold at price levels considerably under those established by the steel code.

Reinforcing Steel

Small-lot ordering is in unchanged volume, but projects calling for more than 100 tons are very scarce. About 1800 tons of bars in this district is now active, and included in this tonnage is 200 tons for the Bronx spans of

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the Triborough bridge and 820 tons for a sewer in the Bronx, N. Y. Bids go in tomorrow on the general contract for the plaza and approaches to the Midtown tunnel at New York, which will require about 4000 tons of bars.

Scrap

Italian payments for scrap shipments have improved considerably during the past few weeks, and that country is now taking heavier shipments on old contracts and is also in the market for additional commitments. Inasmuch as Italy takes No. 2 steel, one broker has lifted his buying price to $7.50 a ton for this grade in order to accelerate the flow. Likewise, it is reported that one broker is paying above $8.50 for No. 1 steel in occasional cases. However, this practice is not widespread enough to justify a change in the $8.50 quotation. Japanese shipments continue in a heavy volume, but new ordering from that country has fallen off considerably as a reflection of poorer steel activity in Japan and also the difficulty of securing boats. Evidently Japan's steel requirements are now not so heavy as was expected inasmuch as the pacification of additional parts of China has been uniquely amicable.

Detroit Scrap Market Is Lethargic

DETROIT, June 11.—The local scrap market has not possessed much vitality the past week. The Detroit district steel mill bought a small tonnage of old material but, with a substantial stock in its yards, is not a large buying factor at the moment. Scrap is moving out of Detroit to lower Lake ports in good volume, and the total tonnage shipped by water this year is expected at least to equal that in 1934. Prices are unchanged from a week ago.

Output Due for Drop In South

BIRMINGHAM, June 11.—The Ensley rail mill and the five Ensley open-hearth furnaces are scheduled to close down this week, as all rail orders will be finished. One or more of the three Ensley blast furnaces will also be banked and within a short time it is likely that all three will stop production. The week thus starts with 11 open-hearth units, but by the end there will be only six. There are also 10 active blast furnaces which will be subject to the stoppages at Ensley.

Current buying of steel and iron is mostly on a spot basis and in small lots. The markets are affected by seasonal factors as well as the NRA decision. Books have been opened for the third quarter, but contract tonnage to date has been negligible. Contracts are generally sluggish at this time of the year. Moreover, the price situation offers no inducements, and some consumers are marking time in hope of reductions. On the whole, new business for current consumption has had only a slight recession.

June pipe lettings will not be so numerous as in May, but shipments will run about the same, because of releases on previous awards. Last week there was only a small amount of new tonnage.

The scrap market is dormant in practically all lines.

Pipe Lines

McKnab Oil & Gas Co., St. Louis, care of James A. Waechter, Telephone Building, attorney, plans welded steel pipe line from natural gas fields near Bowling Green, Ky., to St. Louis, for commercial gas supply, including loop steel pipe line around city. Cost about $4,500,000 with distribution facilities. It is proposed to arrange financing through Bills Corpn., 134 South LaSalle Street, Chicago, B. F. Bills, head.

Simrall Pipe Line Co., Mount Pleasant, Mich., has authorized construction of new 6-in. welded steel pipe line from pumping station in new Crystal Township oil field district to Mount Pleasant, about 28 miles for crude oil supply for refinery of Roosevelt Oil Co., at latter place. It will replace a present 4-in. line to Riverdale district, near Mount Pleasant.

United Carbon Co., Union Trust Building, Charleston, W. Va., plans new 4-in. welded steel pipe line from natural gas wells on Rockcastle Creek to point near Louisa, Ky., for company gas suppy.

Pennsylvania Railroad Co., 15 North Thirty-second Street, Philadelphia, E. J. Lamneck, purchasing agent, asks bids until June 18 for steel pipe (Contract 9-1935); also for steel boiler tubes.

United States Engineer Office, Zanesville, Ohio, asks bids until June 18 for steel pipe for gas service of East Ohio Gas Co., covering changes in lines Nos. 2, 3, 4 and 5 of that company, to be made by Government at Bolivar and Dover Reservoirs (Circular 123).

Cortez Oil Co., Trinity Life Building, Fort Worth, Tex., B. F. Weekley, head, has authorized surveys for proposed 10-in. welded steel pipe line from Sanfordyce oil field district, Hidalgo County, recently opened, to new terminal at Port Isabel, Tex., about 25 miles; pipe line gathering system will be installed in oil field district noted. Tank storage and distribution plant, with steel tanks for 80,000 bbl. capacity, will be built. Cost close to $500,000. Edgar H. Stapper & Co., 21 West Street, New York, investment securities, are interested in project.

Boulder City, Nev., will take bids July 7 on 500 tons of steel pipe for use at power house. Specification 627.

Price City, Utah, will vote on bonds June 15 for 258 tons of 14 and 18-in. steel pipe.

National Tube Co., Pittsburgh, has been awarded 13,500 tons of 8⅝-in. steel pipe for a gasoline pipe line from Harrisburg to vicinity of Pittsburgh by the operating subsidiary of Atlantic Refining Co., Philadelphia.

Reinforcing Steel

Awards 1980 Tons—New Projects 1545 Tons

AWARDS

Enfield, Mass., 1000 tons, dam, to Concrete Steel Co.

Hartford, Conn., 100 tons, St. Joseph College unit to Concrete Steel Co.

Stickney, Ill., 675 tons, boiler house, to Concrete Steel Co.

Lake Forest, Ill., 160 tons, water works, to Concrete Engineering Co.

San Francisco, 104 tons, Girls High School, to Gunn-Carle Co.

NEW REINFORCING BAR PROJECTS

Munford, N. Y., 125 tons, grade crossing for Baltimore & Ohio Railroad; bids in.

Buffalo, 250 tons, grade crossing for Erie Railroad; bids in.

Chicago & North Western Railroad, 1000 tons, 12 overhead crossings in northern Illinois and southern Wisconsin.

Maricopa County, Ariz., 167 tons, State underpass; general contract awarded.

Wagner-Connery Bill Reported to House

WASHINGTON, June 11.—Favorable report was made today on the Wagner-Connery labor disputes bill by the House Committee on Labor. Proponents are seeking to rush the measure to early enactment. It remains to be passed by the House following its recent passage by the Senate by an overwhelming vote. The Senate bill was sponsored by Senator Wagner of New York. The House bill is being sponsored by Representative Connery of Massachusetts. The Wagner bill would set up an independent national labor board to handle disputes growing out of collective bargaining. The Connery bill differs from the Wagner bill only in that the former would place the board in the Department of Labor.

The Connery bill was redrafted in order to meet the Supreme Court NRA decision. Opponents still say it is unconstitutional.

The report on the bill bitterly attacks industrialists and charges they attempted to circumvent Section 7-a of the recovery act. The bill establishes the majority rule urged by organized labor and would abolish so-called company-dominated unions. The belief prevails generally that the President will sign the measure if it reaches the White House, as it is thought it will.

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Fabricated Structural Steel

Lettings in Better Volume—New Projects Higher

INCLUDING 9000 tons for a trestle for the Grand Coulee dam project in Washington, structural steel awards totaled 12,915 tons, compared with 5700 tons last week. New projects of 16,275 tons compare with 9850 tons in the previous week and 28,000 tons two weeks ago. Outstanding new jobs are 10,000 tons for the Bronx approach to the Tri-Borough bridge in New York and 2000 tons for a mill building at Savannah, Ga., for the Union Bag & Paper Co. Plate lettings account for 2800 tons, with 15,750 tons pending and under consideration. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

Hanover, N. H., 137 tons, Dartmouth College unit, to Lyons Iron Works, Inc., Manchester, N. H.

Revere, Mass., 200 tons, grandstand, to New England Structural Co.

Central Vermont Railway, 450 tons, bridge at Hartford, Vt., to American Bridge Co.

Sewickley Heights, Pa., 165 tons, indoor tennis court, to Keystone Engineering Co.

Plymouth, Pa., 215 tons, Luzerne County bridge, to American Bridge Co.

Maspeth, Long Island, 700 tons, building for National Can Co., Inc., to unnamed fabricator.

THE SOUTH

Belle, W. Va., 100 tons, building for du Pont de Nemours Co., to McClintic-Marshall Corpn.

State of Virginia, 115 tons, highway bridge over New River, to Bethlehem Fabricators, Inc.

Charlotte, N. C., 230 tons, General Motors building, to Southern Engineering Co.

State of Georgia, 105 tons, highway bridge over Champney River, to Ingalls Iron Works Co.

CENTRAL STATES

Chicago, 330 tons, beef house, to Hansell-Elcock Foundry Co.

Dearborn, Mich., 200 tons, soya bean plant for Ford Motor Co., to Whitehead & Kales Co.

Trenton, Mich., 110 tons, bridge, to R. C. Mahon.

Nickel Plate Railroad, 130 tons, bridges at Muncie and Albany, Ind., to Fort Pitt Bridge Works Co.

WESTERN STATES

Los Angeles, 250 tons, high school, to Consolidated Steel Corpn.

Los Angeles, 100 tons, tunnel forms for Metropolitan Water District, to Pacific Iron & Steel Co.

Bonneville, Ore., 375 tons, Eagle Creek bridge on Bonneville Dam project, to Pacific Coast Steel Corpn.

Grand Coulee Dam, Wash., 9000 tons, trestle, to Consolidated Steel Corpn.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Millikens Crossing, Me., 280 tons, bridge.

New York, 150 tons, pier reconstruction for Tri-Borough Bridge; bids due June 17.

New York, 10,000 tons, Bronx approach to Tri-Borough Bridge; bids due June 27.

Teaneck, N. J., 250 tons, high school building.

Bridgetown, Pa., 150 tons, building for Owens-Illinois Glass Co.; bids due June 14.

SOUTH AND SOUTHWEST

Augusta, Ga., 225 tons, spillway.

Savannah, Ga., 2000 tons, mill building for Union Bag & Paper Co.

Norris Dam, Tenn., 1000 tons, power plant for Tennessee Valley Authority.

Anniston, Ala., 170 tons, S. H. Kress Co. building.

Florence, Ala., 300 tons, bridge.

Maricopa County, Ariz., 195 tons, State bridge over Hassayampa River; bids June 21.

CENTRAL STATES

Milwaukee, 100 tons, grade separation for Milwaukee Road; general contract let to Klug & Smith Co., Milwaukee.

Pontiac, Mich., 1000 tons, Fisher Body Corpn. cafeteria and storage building.

WESTERN STATES

Stockton, Cal., 184 or 240 tons, County bridge over Honker Cut; bids rejected and new bids will be taken soon.

Bonneville Dam, Ore., 240 tons, four gantry cranes; bids June 25.

Bonneville Dam, 5600 tons, gates; bids advanced from June 25 to July 9 at Portland.

FABRICATED PLATES

AWARDS

South Glens Falls and Hudson, N. Y., 250 tons, two spherical holders for New York Power & Light Co., to Chicago Bridge & Iron Works.

Hartford, Conn., 335 tons, tank for Hartford Electric Light Co., to Chicago Bridge & Iron Works.

Grafton, W. Va., 1000 tons, Tygart River dam tunnel lining, to Treadwell Construction Co., Midland, Pa.

Princeton, Wis., 125 tons, elevated water tank, to Pittsburgh-Des Moines Steel Co.

Mammoth, Yellowstone National Park, Wyo., 550 tons, pipe line at power plant, to Steel Tank & Pipe Co.

Los Angeles, 100 tons, water stops for Metropolitan Water District, to Consolidated Steel Corpn.

Seattle, 180 tons, rebuilding of Ferryboat Kalakala, to Pacific Coast Steel Corpn.

San Jose, Cal., 137 tons, Coyote dam and spillway, to an unnamed bidder.

Juntura, Ore., 100 tons, Agency Valley outlet pipe, to an unnamed bidder.

NEW PROJECTS

Chicago, 500 tons, dredge for Fitzsimons & Cornell Dredge & Dock Co.

Gallup, N. M., 200 tons, tank.

Bakersfield, Cal., 400 tons, tanks.

Los Angeles, 8000 to 9000 tons, five miles for pipe line on Colorado River project; funds being sought by Metropolitan Water District.

Long Beach, Cal., about 2000 tons, six tanks for city; plans approved.

Los Angeles, 150 tons, refinery for Wilshire Oil Co.

San Diego, 4000 tons, El Capitan pipe line, City Council has asked Public Works Administration for a two weeks' extension of time before withdrawing loan and grant of $219,000 so that a special election may be held.

SHEET PILING

NEW PROJECTS

Wilmington, Del., 1200 tons, breakwater; bids to be taken by United States Engineer Office.

State of Tennessee, 500 tons, for Tennessee Valley Authority.

Fort Peck, Mont., 9413 tons for retaining walls; Spillway builders, Inc., low bidder on Schedules Nos. 1 and 2.

Cast Iron Pipe

Medford, Mass., has awarded 300 tons of 6, 8 and 16-in. to Donaldson Iron Co.

Sanitary District, Chicago, has awarded 400 tons to James B. Clow & Sons, and 150 tons of plain material to local dealers.

Chicago is in the market for 203 tons of standard special castings for 3 to 24-in. water pipe.

Chicago will buy 113 tons of cast iron offset bends for 6, 8 and 12-in. water pipe.

Princeton, Wis., has placed 150 tons of 6 and 8-in. with James B. Clow & Sons.

Waldo, Wis., closes bids June 21 on 7700 ft. of 4 and 6-in. cast iron pipe, with alternate bids on transit pipe for new waterworks plant.

Board of Water Commissioners, Louisville, and Louisville Water Co., 435 South Third Street, will install 8-in. pipe in western part of city, replacing present 4-in. water lines. Fund of $51,750 has been approved by city for work.

East Tupelo, Miss., plans water pipe lines. Fund of $20,000 is being arranged for this and sewage system. R. M. Striger, Tupelo, Miss., is consulting engineer.

Cotuit, Mass., plans pipe lines for water system; also elevated steel tank and tower, pumping station and other waterworks construction. Cost about $130,000. Whitman & Howard, 89 Broad Street, Boston, are consulting engineers.

Board of Supervisors, Galveston County, Galveston, Tex., plans about 42,680 ft. of 6-in. for water system. Cost about $46,000. Financing is being arranged through Federal aid. C. C. Washington is county engineer in charge.

San Francisco plans pipe lines for auxiliary water system for fire protection, known as Section C, Marina district extension. Cost $139,000. Financing is being arranged through Federal aid.

Board of Commissioners, Pinellas County, Clearwater, Fla., plans pipe line for main water supply from Pass-a-Grille to Indian Rocks Beach, about 16 miles. Cost about $293,000. Financing is being arranged through Federal aid. John F. Reynolds, Jacksonville, Fla., is consulting engineer.

Charleston, S. C., plans water pipe line along Cooper River waterfront for fire protection. Fund of $100,000 will be arranged for this and other waterfront improvements.

New Madison, Ohio, plans water pipe lines. Fund of $40,200 has been arranged through Federal aid for this and other waterworks installation.

Elmhurst, Ill., closes bids July 1 for pipe for water system. Fund of $18,500 has been arranged through Federal aid. Gordon & Bulot, 53 West Jackson Boulevard, Chicago, are consulting engineers.

Pine Grove, W. Va., plans pipe lines for water system. Fund of $44,000 has been arranged through Federal aid for this and other waterworks construction.

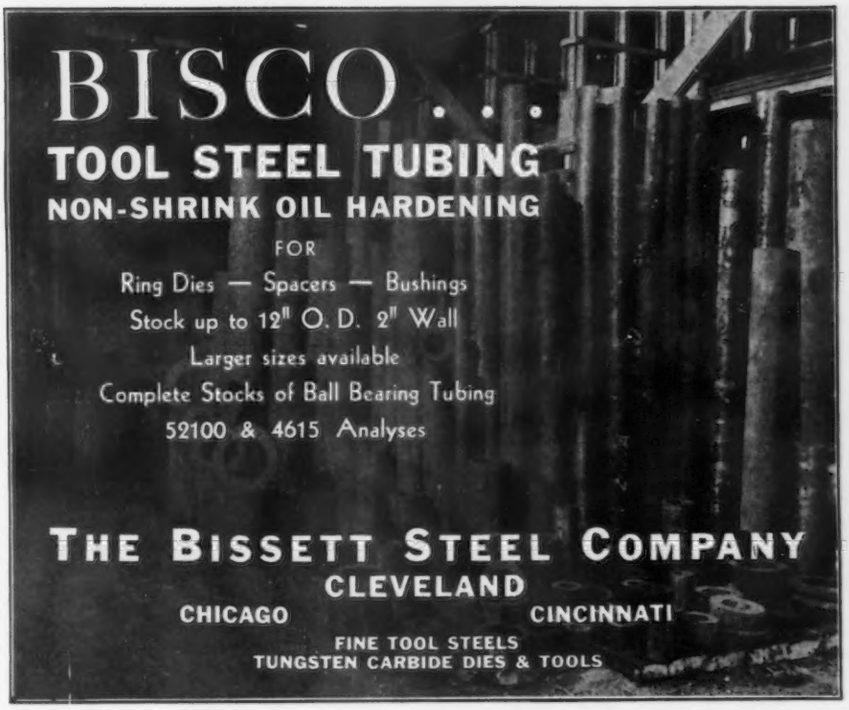
Gladewater, Tex., plans water pipe lines. Special election has been called June 15 to approve bonds for $150,000 for this and other waterworks installation.

Oakland, Cal., has awarded 2650 tons of 4 to 20-in. to United States Pipe & Foundry Co.

Seattle has let 350 tons of 16-in. to United States Pipe & Foundry Co.

Spokane, Wash., has purchased 118 tons from Pacific States Cast Iron Pipe Co.

Santa Monica, Cal., has placed 150 tons of 4 and 6-in. with American Cast Iron Pipe Co.



Prairie City, Utah, will open bids June 25 on 102 tons of 4-in.

Price, Utah, will vote June 15 on bonds for water system improvements which include 1250 tons of cast iron pipe and 258 tons of steel pipe.

Woodruff, Utah, has opened bids on 165 tons of 4 and 6-in.

Riverside, Cal., has awarded 375 tons to United States Pipe & Foundry Co.

Garden City, Utah, will take bids June 25 on 180 tons.

Scrap Prices Drop At Cincinnati

CINCINNATI, June 11.—Rallying from early reaction to the NRA code decision, the district market has resumed its steady, unspectacular course. Announcements by furnaces, following general acceptance of voluntary code compliance, tended to remove uncertainty. Pig iron consumption, however, remains unchanged, and melters continue to limit purchases to spot orders of less than 100 tons. Total sales continue in the neighborhood of 600 tons, with Southern furnaces supplying about 150 tons. Some automotive foundries are in good production, while machine tool melters report slightly better operations.

Demand for finished sheets has tended downward, consumers having passed the peak of recent manufacturing activity. Automotive specifications are noticeably lighter, but miscellaneous demand holds in almost unchanged volume. Galvanized sheets continue active, and the leading district interest reports operations at nearly full capacity in its galvanizing units. District sheet mills are continuing code conditions by voluntary action, and prices, previously announced, are being sustained. Rolling schedules the past week were near 60 per cent of mill capacity, while estimates for this week indicate between 55 and 60 per cent production.

The usual seasonal decline in warehouse demand is seen in the slight tapering of business this month. Price levels are being well maintained. Buying for Government projects is nil.

Scrap demand moves within the narrow confines of mill needs. Advance ordering is nil and prices have eased to levels of a month ago. Despite attractive bid schedules, dealers are wary of long positions and are buying only for application on old commitments.

Plate Orders Off In April

WASHINGTON, June 11.—Orders for fabricated steel plate in April of this year declined to 13,244 tons from 16,822 tons in March. In the four months ended with April, bookings aggregated 63,918 tons against 89,547 tons in the corresponding period of last year. In April, 1934, orders were 20,085 tons.

Prime Western Drops to 4.25c. a lb. Lead Moderately Active at 4c. a lb.

Copper Sales on Monday Total 2234 Tons, Bringing Month's Total to 4016 Tons—Tin Inactive and Lower

NEW YORK, June 11.—Following several days of disinterest, consumers came into the electrolytic copper market yesterday for 2234 tons of metal at 9c. a lb., delivered Connecticut valley. June bookings to date amount to 4016 tons. The Navy Department has made no award on 530 tons of electrolytic copper, on which all sellers bid 9c. a lb. Bidders have been notified that they no longer have to certify adherence to the code of fair competition. This action is taken to signify that "outside" copper can be offered on this contract, and the trade is therefore looking forward with interest to see what bids finally develop. The copper market in Europe has been only mildly active during the week, and today's price is 7.82½c. a lb., c.i.f. usual Continental base ports.

Zinc

A small parcel of second-hand metal offered at 4.25c. a lb., East St. Louis, served to force all sellers down 5 points to this level today. However, little buying has developed. Prime Western sales last week amounted to 1624 tons, all for June delivery and at 4.30c., as compared with 2400 tons in the preceding week and 7500 tons booked two weeks ago. Undelivered orders now amount to 31,500 tons, which represents a decrease of 1850 tons during the past week. Total Prime Western sales in May for delivery during the month amounted to 9277 tons at a weighted average price of 4.215c., East St. Louis. Forward sales during May totaled 22,192 tons at a weighted average price of 4.202c. Concentrates in the Tri-State area continue nominally at $25 and $26 for flotation and mill grades respectively. Sales last week amounted to 350 tons, shipments were 1700 tons, and production totaled 1000 tons. Stocks at the end of the week had declined to 23,600 tons.

Lead

Buying of this commodity was at a standstill following the recent NIRA decision. However, on Thursday the American Smelting & Refining Co. dropped its offers $2 a ton to a level of 4c. a lb., New York, and 3.85c., St. Louis, and this action struck a buying response from the consumers who had ignored earlier declines. The buying activity, which was resumed on Thursday, is still in force, with users contracting for moderate quantities of June metal each day. The St. Joseph Lead Co., which initiated several price advances in May, continues to keep out of the open market by keeping its quotations 10 points higher than those offered by the American Smelting & Refining Co. Inasmuch as consumers have neglected to cover their July requirements to any extent, the present buying volume should be maintained for several weeks. Thus it is quite possible that lead may strengthen to a 4.10c. level, for its statistical position is very favorable. Also the closing down of several St. Joseph properties may result in a decline in stocks over the next month which in turn would additionally strengthen lead's position.

Tin

This market continues almost inactive. American buyers are not greatly in need of supplies and, therefore, are delaying their purchases until after the International Tin Committee makes an announcement regarding third quarter production quotas. It is probable that these quotas may be lifted 5 to 10 per cent to a 50 or 55 per cent level. The doubtful American outlook, however, may discourage the larger advance. Straits tin was available this morning at 50.50c. a lb., New York, and English Refined was listed at a discount of ½c. for spot and June delivery, although not much of the latter metal was available. English prices this morning on first call were £223 10s. and £217 2s. 6d. for spot and future standard respectively, and £225 2s. 6d. for Straits at Singapore.

The Week's Prices. Cents Per Pound for Early Delivery

	June 5	June 6	June 7	June 8	June 10	June 11
Electrolytic copper, N. Y.*	8.75	8.75	8.75	8.75	8.75	8.75
Lake copper, N. Y.	9.12½	9.12½	9.12½	9.12½	9.12½	9.12½
Straits tin, spot, New York	51.20	50.90	50.50	..	50.50	50.50
Zinc, East St. Louis	4.30	4.30	4.30	4.30	4.30	4.25
Zinc, New York†	4.67½	4.67½	4.67½	4.67½	4.67½	4.62½
Lead, St. Louis	3.95	3.85	3.85	3.85	3.85	3.85
Lead, New York	4.10	4.00	4.00	4.00	4.00	4.00

*Refinery quotations; price ¼c. higher delivered in Connecticut.
†Includes emergency freight charge.

Aluminum, virgin 99 per cent plus, 19c. to 21c. a lb., delivered.
Aluminum, No. 12 remelt, No. 2 standard, in carloads, 16.25c. a lb., delivered.
Nickel, electrolytic, 35c. to 36c. a lb., base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 12.75c. a lb., New York.
Brass ingots, commercial 85-5-5-5, 8c. a lb., delivered; in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	51.50c. to 52.50c.
Tin, bar	53.50c. to 54.50c.
Copper, Lake	10.25c. to 11.00c.
Copper, electrolytic	10.00c. to 10.50c.
Copper, castings	9.75c. to 10.75c.
*Copper sheets, hot-rolled	16.00c.
*High brass sheets	14.25c.
*Seamless brass tubes	16.00c.
*Seamless copper tubes	16.25c.
*Brass rods	12.75c.
Zinc, slabs	5.75c. to 6.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	4.50c. to 5.60c.
Lead, bar	5.50c. to 6.50c.
Lead, sheets	7.75c.
Antimony, Asiatic	14.00c. to 15.00c.
Alum. virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	29.50 to 30.50c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	54.75c.
Tin, bar	56.75c.
Copper, Lake	10.00c.
Copper, electrolytic	10.00c.
Copper, castings	9.75c.
Zinc, slabs	5.75c. to 6.00c.
Lead, American pig	4.65c. to 5.40c.
Lead, bar	8.00c.
Antimony, Asiatic	15.75c.
Babbitt metal, medium grade	19.25c.
Babbitt metal, high grade	58.75c.
Solder, ½ and ½	32.25c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy, crucible	6.00c.	6.75c.
Copper, hvy. and wire	5.87½c.	6.37½c.
Copper, light and bottoms	4.87½c.	5.37½c.
Brass, heavy	3.25c.	3.87½c.
Brass, light	2.50c.	3.25c.
Hvy. machine composition	4.87½c.	5.37½c.
No. 1 yel. brass turnings	4.25c.	4.75c.
No. 1 red brass or compos. turnings	4.50c.	5.00c.
Lead, heavy	2.87½c.	3.25c.
Zinc	2.25c.	2.62½c.
Cast aluminum	10.62½c.	11.75c.
Sheet aluminum	12.00c.	13.50c.

Activities Bearing on Machine Tools Distribution

o o o

A Department Conducted by L. M. Waite

o o o

Orders

An aircraft manufacturer has placed a very considerable number of machine tool orders during the past two weeks. One dealer alone received some $40,000 of the business.

* * *

The Lackawanna plant of the Bethlehem Steel Co., at *Buffalo*, has been releasing orders for the equipment recently referred to in this column. A prominent machine tool manufacturer received orders for two large roll grinders. Releases are said to amount to something like $50,000.

* * *

The passing of "crack-down" control features which were becoming more and more threateningly a part of prevailing theories of government-in-business has been given as a definite reason for the releasing of a number of machine tool orders which have been under consideration for some time. The release of additional orders, totaling substantial amounts, is said to have been decided upon because of the changed outlook. A *New Jersey* manufacturer last week ordered tools totaling $11,000.

* * *

Two *New England* manufacturers placed $5,000 orders. A *New York State* producer bought three tools approximating $6,500. Southern areas report five machine tool orders released. The *Pacific Coast* expresses belief that several contemplated orders will be released very soon as a result of increased confidence. *Pittsburgh area* reports nothing but "must" orders, largely for individual machines, but in sufficient total volume to register a fairly satisfactory business. The "threat of Washington" is referred to by a prominent Pittsburgh dealer as not entirely dispelled by recent court decisions. Programs for replacement of obsolete equipment have not been released, but there is little hesitancy in buying where equipment can be put to work on actual orders which are subject to prompt shipments rather than for increased inventory.

* * *

Machine Tool Prices

It is inevitable that the design expense assumed by machine tool manufacturers during the depression period should be reflected in higher prices. A number of advances are already in effect and dealers have been notified that others are to be expected in the near future. The designing of new equipment and the incorporation of new features in standard machines is a major expense within the industry and one which far too often has not been absorbed in selling prices. Any review of the designs perfected during the lull in manufacturing activities gives outstanding evidence of the large sums which have been disbursed in the preparation of equipment which shall be capable of meeting the approaching call for more machine production at lesser costs. Men are to work fewer hours during the period of time which will continue to be devoted to a determination of the ultimate hours which will best constitute a working week. Machines must absorb whatever slack in production is caused thereby. A full return of the costs involved in meeting this economic condition is essential to good business. Additional total expenditure within the industry in connection with the machine tool exposition to be held in Cleveland, Sept. 11-21, will run into large figures. Exhibits at Cleveland will definitely demonstrate the fact that the industry did not just fold up and wait for happier days during almost orderless months of depression.

Personals

Clark R. Phiffer has accepted the superintendency of the V & O press plant at Hudson, N. Y. Mr. Clark was formerly general foreman of the refrigerator department tool room, General Electric Co., Schenectady, N. Y. On April 27, at Edison Hall, Schenectady, heads of the refrigerator section gave a presentation dinner featuring the associate-esteem which Mr. Phiffer built up during connection with the General Electric Co.

* * *

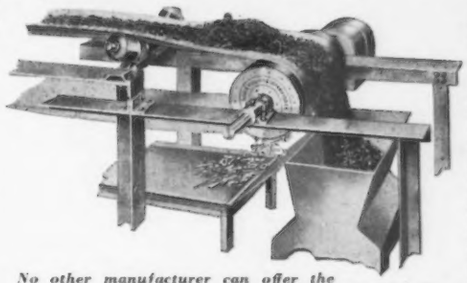
J. H. Tredinnick, formerly factory manager V & O Press Co., Hudson, N. Y., has become identified with the E. W. Bliss Co., Hastings, Mich., plant as assistant to Supt. Joseph McKnight.

* * *

Available Funds

Members of the Associated Machine Tool Dealers have been supplied with full data as to the revised FHA regulations in so far as they pertain to governmental cooperation with banks in providing funds for machine tool purchases. The information has been made available by Stewart McDonald, acting housing administrator. Local administrators in all areas and all cooperating banks are in position to supply details. There are many indications that this availability of funds will be made use of over a very considerable part of the country.

IRON PROBLEMS SOLVED



No other manufacturer can offer the experience that is Dings. Since 1899 Dings Engineers have been solving separation problems. This experience has resulted in a line of High Intensity Separators that will extract the most weakly magnetic materials—even slate from coal or protect crushing and grinding equipment from the coarsest tramp iron.

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Dings High Intensity MAGNETIC SEPARATION

DINGS MAGNETIC SEPARATOR CO.
727 Smith Street, Milwaukee, Wis.

Separation Headquarters Since 1899

The Foundry of 1950

(CONTINUED FROM PAGE 19)

one man can control the variables, and the larger jobbing production foundry, where several specialists are necessary and over which there is a larger volume to carry the burden, will be the foundries of 1950.

The 1950 foundry will be air conditioned. There will be improved metal and sand handling equipment. Instead of the necessity for sweeping of floors and gangways by the present broom method, permanently installed vacuum systems will keep all departments free from dirt and dust. There will be automatically controlled lighting units regulated by photo-electric cells and a great many other devices to eliminate the variables involved in the human element.

Waste, such as cupola heat loss up the stack, slags, sand, refractories, indirect supplies, and especially unnecessary cleaning operations in castings, will have been cut to a minimum by new equipment and a better understanding of the physical and chemical reactions of the materials and combinations of materials entering into operations and processes.

Raw materials, metals, fuels, fluxes, refractories and certain of the indirect supplies will have new specifications and characteristics, with a resulting better understanding between supplier and consumer. For example, the pig irons and all of the virgin metallic alloys and their inherent non-metallics will be controlled by means of the spectroscope, the X-ray, high-power microscopes and electro-analysis. We will have proved by 1950 that the physical properties of cast metals are not primarily controlled by the five principal metalloids, namely, carbon, silicon, sulphur, phosphorus and manganese, as at present, but that the non-metallics and the traces of other elements and their combinations are the essential factors in the control of desired properties.

Alloys Will Be Better Understood

Alloys, such as chromium, nickel, molybdenum, etc., are bound to become better understood by 1950 than at present. I do not think it is too bold to prophesy that the foundryman who does not become alloy-minded will be non-existent.

The virtues of alloy cast irons versus other structural materials for definite applications have scarcely been touched upon. I refer in particular to the vibration damping effect or "dynamic ductility" as expressed by von Heydekampf. Other virtues are fatigue properties, freedom from "notch effect," corrosion and heat resistance, and resistance to thermal shock. All of these features will be definitely established in the higher alloy compositions during the 15 years immediately in front of us.

How will we be melting or processing these alloys in 1950? Personally I think the cupola will continue to maintain its prominence. There will be radical changes in this type of melting unit as we more intelligently understand what really takes place within its various zones and our knowledge develops with respect to the five things that enter into its operation: that is, refractories, fuels, fluxes, metals and air. In order to understand more thoroughly what has taken place within the cupola, we must study not only the product sought, but the by-products developed in the process. There are two by-products—gases and slags — both of which will be considered as important in successful operation as are the materials charged.

Cupola Will Be More Efficient

I can visualize the cupola of 1950 melting twice the present rates per hour for the same size unit and with higher efficiencies than cupolas today. This will be brought about by several changes in construction, such as water cooling, high temperature zones, improved refractories and improved tuyere designs. By processing the air supply, such as drying, preheating and possibly enriching the oxygen content, we will double the melting rates. Improved coke with respect to burning rate, ash conditions, sizing, etc., will also have a great influence not only in increasing the efficiency and capacity, but also in controlling the carbon content and quality.

My guess is that we will operate a cupola more along the lines of a blast furnace over long periods of time, without the daily dropping of the bottom and necessary repairs.

Triplexing Will Be An Established Practice

Electric furnaces as used today, both the indirect and the direct arc

types, will continue to find new applications not only for cold melting and duplexing, but for triplexing and as a means of maintaining uniform high temperatures where a continuous uninterrupted supply of molten iron is necessary. The induction type of electric furnace also will have established itself in the 1950 foundry. Powdered coal-fired furnaces, air furnaces and crucible furnaces will be employed for definite applications. There is one refining unit, the Bessemer converter, which unquestionably will find its way into the gray iron foundry by 1950. At that time we will be triplexing large quantities of metal, from the cupola into the Bessemer, and then into the electric furnace where the necessary alloying and superheating will be completed.

In the molding division of the 1950 foundry, we may expect even more changes than have taken place during the last 20 years. Synthetic refractories and binders and the technical control of their properties will be a certainty, and with this control established, there will follow new methods of sand handling and molding. Closed conveying systems from the conditioning units to the mold blowing machines is one possibility. Mathematical formulas for venting, gating, mold hardness and pouring temperatures will be available to the foundry executive. The same is true with respect to core-making methods and core sand mixtures. New developments in core binders, possibly air drying, will eliminate expensive equipment for drying and handling.

Permanent Molds Will Find Greater Vogue

In laying out a progressive system for the 1950 foundry, one must keep in mind ideal working conditions for the laborer. Consequently, after we have the mold properly fitted with cores ready for pouring, we will convey it into a separate pouring and cooling room where adequate ventilation and air conditioning are provided. After cooling, it will pass on to the shakeout and then to the cleaning rooms.

The cleaning of castings made in the 1950 foundry should be comparatively easy. There will be no reason for sand burning where properly prepared refractories are used. Excessive grinding, due to swells, fins, cutting, etc., should be a thing of the past.

In addition to the ordinary methods of molding, there will be a wider application of the new methods, more particularly the permanent or metal mold process, the centrifugal casting process and the pressure casting process. I believe that permanent molding will have developed by 1950 to an extent where complicated castings with undreamed of properties will be made by this method. By the use of alloys, by taking advantage of the self-forging effect and by solidification rate control, we will be able to produce castings with closer mechanical tolerances and physical properties than at present. The centrifugal and pressure methods will also be used more extensively. Alloys which do not lend themselves readily to sand castings will be made by these methods, facilitated by means of controlled atmospheres within the molds.

Directional Solidification Will Be a Reality

The hit-and-miss methods of heat treating castings as practiced today will give way to a science controlled by technically trained men. I look for real developments beginning with the moment that a mold is filled with molten metal and progressing with the casting into the finished product. By 1950 directional solidification will be a reality. There will be special applications of the induction hardening methods, and other localized treatments to develop special properties will be common practice. Long cycle malleablizing operations will have been reduced to at least one-tenth the present time.

A discussion of the foundry of 1950 would not be complete unless we also express our conception of the 1950 foundryman. It is apparent that a good foundry executive will require a thorough knowledge of chemistry and physics, or perhaps better still, p h y s i c a l chemistry. Our colleges will be required to prepare men to fill these positions. The foundry has been frowned upon by graduates as an undesirable place to work. By 1950 this illusion will have disappeared and the technical man will realize that there is as much, if not more, science involved in producing good castings as in any other single branch of industry.

The foundry of 1950 will be an institution wherein science will play an important part along with experience. The continued efforts of large research groups and colleges will be the beacons to guide us in attaining our conceptions of the ideal foundry 15 years hence.

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In the preparation of food products and in the screening, sizing and straining operations of chemicals, minerals, stone, coal and other materials, perforated metal plays an important part. H&K standards of quality and accuracy assure you of all that is best in screens. May we aid you in your selection?

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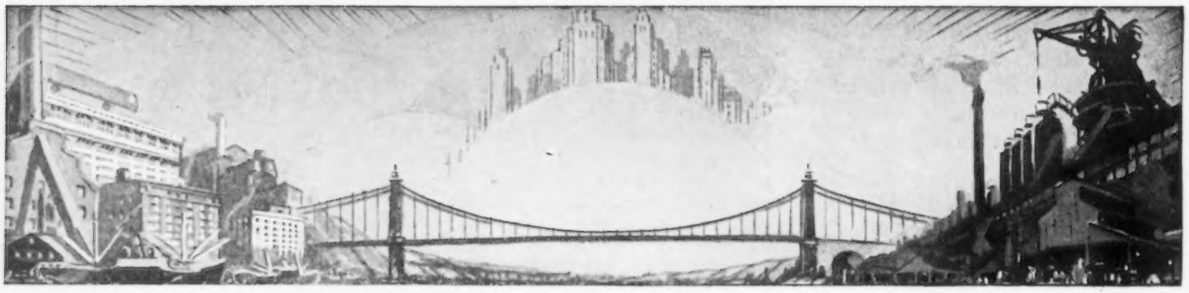


Plant Expansion and Equipment Buying

Machine Tool Demand Now Marking Time

A TEMPORARY lull in the rising demand for machine tools was the response last week to the outpouring of pessimism from the shores of the Potomac. The same influences which caused a drop in the stock market undoubtedly were successful in causing investors in capital goods to hesitate temporarily regarding future commitments. Current indications, however, are that there will shortly be a reaction in a bullish direction. Relative position of tools in consumer interest is unchanged although the slackening of demand affected all types except drills. Several single orders for upright standard drills added a bright spot to the general outlook, since these have been unusually slow for some time. The trend toward more standard tools, with a corresponding easing in special requirements is hailed as an indication of reviving interest in regular retooling. Machine tool factories are operating at an average of about 30 per cent of total capacity.

NORTH ATLANTIC

Air Reduction Sales Co., Inc., New York, and 3148 South Homan Avenue, Chicago, has plans for one and two-story addition, 72 x 250 ft., at Chicago plant. Cost about $100,000 with equipment. A one-story service and garage building, 50 x 100 ft., also will be built. Bernard R. Klekamp, 140 South Dearborn Street, Chicago, is architect.

Union Bag & Paper Corpn., Woolworth Building, New York, has arranged for purchase of 425 acres at Hermitage Plantation, Savannah, Ga., as site for new pulp and paper mill, and paper converting plant, to include power house, machine shop and other mechanical departments. Timber rights to tracts of Georgia slash pine have been secured for raw material supply, and plant will be established for this operation. Entire project will cost close to $4,000,000 with equipment. George F. Hardy, 309 Broadway, New York, is consulting engineer.

Signal Supply Officer, Army Base, Brooklyn, asks bids until June 17 for control boxes, keys, etc. (Circular 156); until June 21, control boxes (Circular 159); until June 24, control shafts, tuning shafts and flexible shafting (Circular 144), six motor-generators and 30 motor-generator and battery units (Circular 145), 2800 control units, 900 dials and 2200 tuning units (Circular 143); until June 28, paper-insulated cable in lots of 12,800 to 24,000 ft. (Circular 150).

Board of Education, Mahopac, N. Y., plans manual training department in new two-story school, for which bids will be asked on general contract early in July. Cost about $725,000 with equipment. Knappe & Morris, 171 Madison Avenue, New York, are architects.

Department of Hospitals, City of New York, Municipal Building, plans new power house, machine shop, carpentry and woodworking shop, paint shop, equipment storage and distributing building and mechanical laundry at Neponsit Beach Hospital, Queens. Cost over $400,000 with equipment. Financing is being arranged through Federal aid.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 18 for welders' goggles, frames, helmets, shields, etc. (Schedule 5216), for Brooklyn Navy Yard; 18,000 ft. marine use cable (Schedule 5280), for Brooklyn and Mare Island yards; until June 21, fuel oil and Diesel pumping units and spare parts (Schedule 5266), for Brooklyn and Philadelphia yards.

Parker Pure Rye Co., Quentin Avenue, New Brunswick, N. J., has taken title to plant of Cadgene Piece Dye Works, location noted, and will remodel for new distilling plant. Cost close to $100,000 with equipment.

Wayne Township Board of Education, Mountainview, N. J., plans manual training department in new multi-story school. Cost about $300,000. Hacker & Hacker, Fort Lee Trust Building, Fort Lee, N. J., are architects.

National Drying Machinery Co., 39 East Ashmead Street, Philadelphia, has leased about 16,000 sq. ft. of floor space at South Hancock Street and Lehigh Avenue for plant.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 18 for two motor-driven turret track turning machines (schedule 5324), 130 aircraft directional gyros (Schedule 5286); until June 21 one motor-driven press type forming brake (Schedule 5335), for Philadelphia Navy Yard; until June 18, gasoline and oil hose for Philadelphia, Sewall's Point, Pensacola and San Diego navy yards (Schedule 5308).

Chas. Lennig & Co., Inc., 5000 Richmond Street, Philadelphia, manufacturer of industrial chemicals, has plans for two-story addition. Cost about $75,000 with equipment.

BUFFALO DISTRICT

Elmira Vanities, Inc., Elmira, N. Y., recently organized to manufacture enameled metal specialties, has acquired former plant of Queen City Knitting Mills, Eighteenth Street, and will remodel for manufacturing purposes. Company is headed by Harry L. V. and Benjamin M. Berinstein.

National Grinding Wheel Co., Inc., Erie Avenue, North Tonawanda, N. Y., has asked bids on general contract for two-story addition, 80 x 100 ft. Cost over $40,000 with equipment. C. H. Field, Village Hall, Williamsville, Buffalo, is engineer.

New York Central Railroad Co., 466 Lexington Avenue, New York, plans new power house in connection with proposed terminal buildings at Syracuse, N. Y. Cost over $50,000 with equipment. J. W. Pfau is chief engineer.

NEW ENGLAND

J. L. Lucas & Son, Inc., 3 Fox Street, Bridgeport, Conn., manufacturer of machinery and parts, has filed plans for one-story addition, 27 x 90 ft., on Bennett Street.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until June 19 for automatic combustion control system for oil-fired steam boilers at National Fuel Depot, Melville, R. I. (Specification 7944).

Curtis Universal Joint Co., Inc., Springfield, Mass., has been organized by Charles J. Inman and George V. Curtis, 202 Ohio Avenue, West Springfield, to manufacture mechanical specialties.

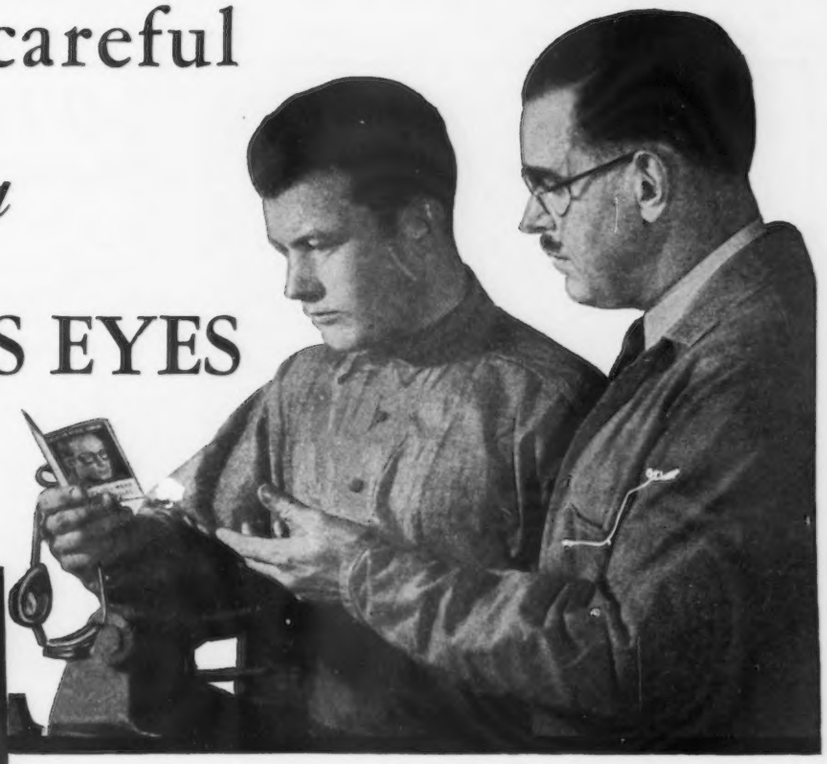
Union Water Co., Lewiston, Me., plans rebuilding part of power plant recently destroyed by fire. Loss over $40,000 with equipment.

Board of Selectmen, Town Hall, West Bridgewater, Mass., H. E. Bryant, clerk, closes bids about July 1, for new steam power house for central heating service for municipal buildings. Cost over $70,000 with equipment.

Public Works Officer, Navy Yard, Boston, has secured appropriations for following extensions and improvements at local yards: New artificial gas plant and incinerator unit, $90,000; modernization and extensions in electric light and power system, $153,900; modernization and improvements in shops and other buildings, $491,800; improvements in power, heating and refrigerating plants, including equipment, $48,600; improvements in railroad tracks, $47,500; repair and improvements in waterfront structures, $228,600.

Connecticut Equipment Co., West Haven, Conn., has been organized by Leon M.

Be *twice* as careful *with a* NEW MAN'S EYES



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A machinery manufacturer reports a hard-driven fragment shot straight for a chipper's eye—on his second day at the job. The chipper stood to lose his eye . . . and the company many dollars in compensation, medical and hospital expenses, lost time and production delays—but goggles saved the eye and the profit.

But it isn't enough to supply your men with goggles. Workers need different kinds of eye protection for different kinds of jobs. That's why American Optical Company makes a complete line of goggles . . . and provides a service that insures each man getting exactly the goggle he needs. The AO industrial man stationed near you will be glad to survey your plant, study the eye hazards, and make recommendations. Write or call the AO branch office near you today.

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JOHANSSON DIVISION DEARBORN, MICHIGAN

Gabriel, 230 William Street, and associates, to manufacture oil burners and oil-burning equipment.

SOUTH ATLANTIC

Bahnson Co., Inc., South Marshall Street, Winston-Salem, N. C., manufacturer of air-conditioning systems and allied equipment, has approved plans for three-story addition. Cost over $45,000 with equipment.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until June 19 for stoker equipment, forced-draft fans, and automatic combustion and draft-control equipment for Marine Barracks, Parris Island, S. C. (Specification 7916).

Chevrolet Motor Co., Detroit, has let general contract to Southeastern Construction Co., 218 West Second Street, Charlotte, N. C., for one-story factory branch and parts plant at Charlotte, to be operated in name of Chevrolet Motor Parts Corpn. Cost about $175,000 with equipment. Albert Kahn, Inc., New Center Building, Detroit, is architect and engineer.

Quartermaster, Naval Air Station, Pensacola, Fla., plans new paint and oil storage and distributing building at yard. Cost about $30,000 with equipment. Appropriation is being arranged.

MIDDLE WEST

International Harvester Co., 606 South Michigan Avenue, Chicago, has taken out permit for one-story addition to tractor works on West Thirty first Street, 60 x 120 ft. Cost about $40,000 with equipment. O. A. Kruger, is company engineer.

Milwaukee Road, Union Station, Chicago, has let general contract to Barnett & Record Co., Flour Exchange Building, Minneapolis, Minn., for one-story addition to engine house and repair shops at Minneapolis, 110 x 150 ft. Cost about $45,000 with equipment. C. F. Loweth, first noted address, is chief engineer.

United States Engineer Office, Rock Island, Ill., asks bids until June 18 for light and power equipment for lock and dam No. 16, Mississippi River, including transformers and regulators, remote control switch cabinets, gasoline-electric standby power unit, electric tow haulage units, dam power feeders and connections, dam conduit system, lock lighting system, navigation lighting system, fuel oil supply system, hand-operated traveling bridge crane and other equipment (Circular 238); until June 21 for two traveling tainter gate hoists, motor-operated (Circular 242).

Elliott & Co., Thirty-seventh Avenue West and Oneota Street, Duluth, Minn., meat packers, have low bid on general contract from George H. Lounsberry & Son, 322½ East Superior Street, for three-story and basement addition, 61 x 103 ft., including improvements in present plant. Cost over $65,000 with equipment. H. Peter Henschien, 59 East Van Buren Street, Chicago, is architect and engineer.

City Commission, City Hall, Fort Collins, Colo., A. J. Rosenow, city clerk, asks bids until June 18 for two 1500-kw. steam-turbo generators and accessories, two steam generators, two condensers, one 50-kw. house generator, switchboard and instruments, pumping machinery and auxiliaries, and miscellaneous equipment for new municipal electric light and power plant. Fund of $740,000 has been secured for project. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Storm Lake Packing Co., Storm Lake, Iowa, meat packer, has let general contract to Christianson Construction Co., Storm Lake, for new one-story plant, 90 x 120 ft. Cost about $45,000 with equipment.

Pittsburgh Plate Glass Co., paint and varnish division, Milwaukee, has announced $300,000 modernization and enlargement program, $160,000 to be invested in construction and $140,000 in machinery and equipment. E. D. Griffin is general manager of division, with headquarters in Milwaukee.

Eau Claire Radiator Mfg. Co., Eau Claire, Wis., will build an addition, 30 x 40 ft., to its shop at 615 South River Street.

SOUTH CENTRAL

Brown Fence & Wire Co., 1051 Florida Street, Memphis, Tenn., has filed plans for one-story addition, primarily for storage and distribution, including improvements in present plant. Cost about $35,000 with equipment. Headquarters are at Cleveland.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until July 1 for materials, tools, machinery, equipment and supplies for steel tower transmission line from vicinity of Monteagle, Tenn., to Norris Dam power substation, comprising two divisions, one (Division 3) 49.34 miles long, the other (Division 4) 71.68 miles long.

United Gas Public Service Co., Shreveport, La., plans additions in high-pressure natural gas absorption plant at Myrtis, near Rodessa, La., with installation of compressors and other equipment. Cost over $200,000 with machinery.

Standard Oil Co., Inc., in Kentucky, 430 West Bloom Street, Louisville, has secured permit for new bulk oil storage and distributing plant at Panama City, Fla., where about 10 acre tract was recently acquired, to include pumping station, steel tanks and other facilities. Cost over $75,000 with equipment.

Pattison Brothers Kentucky Bourbon Distillery Co., 133 Park Place, Covington, Ky., is considering new distilling plant at Ludlow, Ky., where tract has been secured. It will include power house and other mechanical departments. Cost over $85,000 with equipment.

OHIO AND INDIANA

Johnson Steel & Wire Co., Bailey Road, Cuyahoga Falls, Ohio, will proceed with erection by day labor on one-story addition. Cost about $35,000 with equipment. Headquarters are at Worcester, Mass. J. H. Patterson is manager at Cuyahoga Falls.

Summit Mold Machine Co., 1022 South High Street, Akron, Ohio, manufacturer of tire molds and kindred equipment, plans one-story addition. Cost over $25,000 with equipment.

Cleveland Railway Co., Midland Building, Cleveland, will soon take bids for new electric power substation for booster service, Shaker Heights district. Cost about $55,000 with equipment.

Material Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until June 17 for 15 radial engine transportation cradle assemblies and five V-engine transportation cradle assemblies (Circular 783), 100,000 pressure-type lubricators (Circular 784); until June 18, aluminum tubing and aluminum alloy sheets (Circular 785), 15 antenna (Circular 788), one blueprint paper coating machine (Circular 790); until June 28, 750 parachutes, complete (Circular 794).

Contracting Officer, Quartermaster Corps, Jeffersonville, Ind., asks bids until June 19 for 1500 wood boring bits, 500 ratchet braces, 500 hand chisels, 1000 twist drills, 1500 files, 1000 carpenters' claw hammers, 500 carpenters' bars, 500 screw-driver bits, 500 plumb bobs, 1000 screw drivers, 500 steel measuring tapes, 500 hand saws, 500 hand rip saws, 500 nested saws, 500 nail sets and other tools (Circular 103).

Power King Tool Corpn., 310 East Market Street, Warsaw, Ind., has been organized by Theodore C. Frazer and Harold R. Horrick, to manufacture power tools and other mechanical devices and equipment.

SOUTHWEST

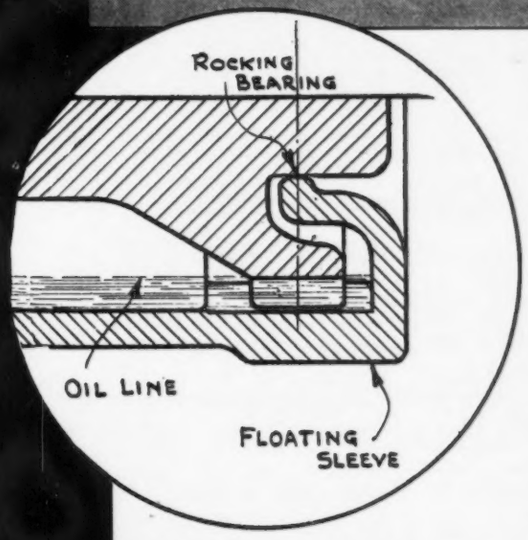
Kroger Grocery & Baking Co., Cincinnati, has plans for new baking plant at 3860 Chouteau Avenue, St. Louis, where two-story building, recently acquired, will be remodeled and two-story addition erected. Installation will include traveling ovens, conveyors, loaders and other mechanical-handling equipment. Cost over $85,000 with machinery. Present St. Louis factory branch is at 1311 South Thirty-ninth Street.

State Board of Affairs, State House, Oklahoma City, Okla., plans new equipment and mechanical shops at University of Oklahoma, Norman, Okla. Cost about $60,000 with equipment. R. R. Owens is engineer for board.

Board of Public Works, City Hall, St. Louis, plans extensions and improvements in power house at city sanitarium, 5300 Arsenal Street, including new boilers, stokers, pumps and other equipment. Cost over $70,000 with equipment.

Board of Education, 911 Locust Street, St. Louis, plans manual training department in new three-story Southwest high school at Kingshighway and Arsenal Street, for which bids on revised plans will soon be asked. Cost about $800,000 with equipment. G. W. Sanger is head of building commission in charge.

Commanding Officer, San Antonio Arsenal, San Antonio, Tex., asks bids until June 17 for one boring machine, electric valve refacer, valve seat grinding outfit, brake relining and grinding machine.



DETAIL drawing of Fast's rocking bearing. Notice that no perishable materials are used to make it dust-proof.

THESE VITAL FEATURES ARE FULLY COVERED BY FAST'S PATENTS.

This Vital Point is Your PROTECTION

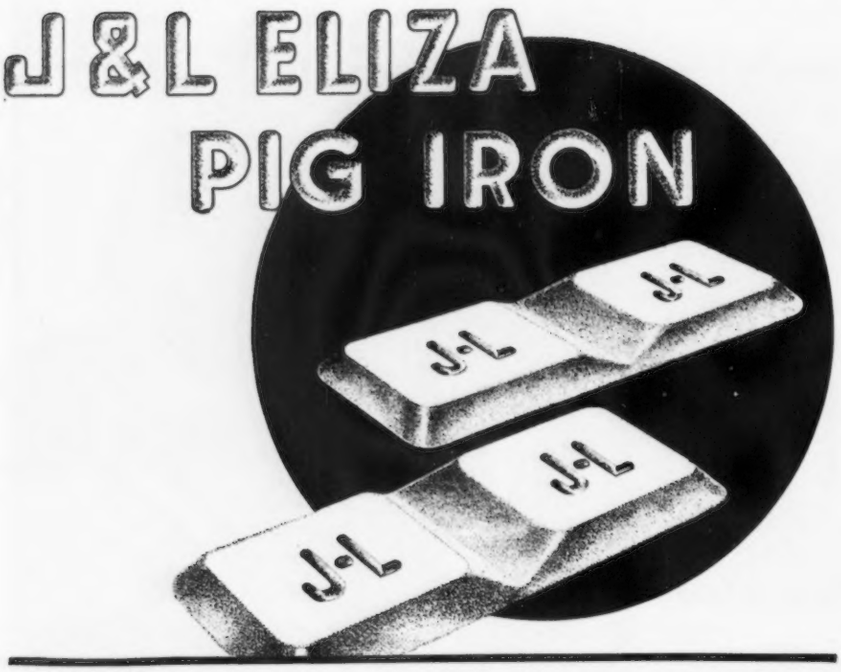
THE rocking bearings that support the floating sleeve of a Fast's Coupling make precise metal-to-metal contact permanently excluding all dust and dirt. These bearings are located at the only place where they will make effective dust-proof seals.

All self-aligning couplings depend upon a film of oil to prevent wear of the load bearing surfaces. When dust works into this oil it forms a paste-like abrasive that causes coupling failure. Fast's couplings do not need to employ leather, cork or composition packing to make them dust-proof.

Specify genuine Fast's all-metal couplings on the machinery you purchase and eliminate the possibility of operating trouble.

The Bartlett Hayward Company

BALTIMORE, MARYLAND



Made without scrap especially for the foundry and malleable trade

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION
AMERICAN IRON AND STEEL WORKS
PITTSBURGH, PENNSYLVANIA

cylinder boring machine, air compressor, connecting rod aliner and straightener, connecting rod bearing boring machine and rebabbitting jib, and one truck lift (Circular 20).

Gulf Refining Co., Houston, Tex., plans extensions in oil refinery at Port Arthur, Tex., with new unit for treating lubricating oils. Cost over $100,000 with equipment. Main offices are in Pittsburgh.

Macwhyte Co., Kenosha, Wis., manufacturer of wire rope, cable, etc., has leased property in Texas & Pacific Terminal group, Fort Worth, Tex., for new Southwestern factory branch, storage and distributing plant.

WASHINGTON DIST.

James Distillery, Inc., 807 Key Highway, Baltimore, will soon begin superstructure for two story addition, for which general contract has been let to Barry F. Cullison, 825 Powers Street. Cost over $45,000 with equipment.

General Purchasing Officer, Panama Canal, Washington, asks bids until June 17 for 22,000 lb. soft steel wire, 5000 lb. barbed wire, 111,000 ft. galvanized or cadmium-plated rigid steel conduit, 6000 ft. brass pipe, 147,000 lb. common wire nails, 4000 lb. wire finishing nails, 36 electric drills, six transformers, 60 knife switches, metallic steam hose, wire rope, pneumatic hose and other equipment (Schedule 3063).

Quartermaster, Marine Corps Flying Field, Quantico, Va., plans new motor-test stand building, cost about $19,200; new paint and oil storage building, cost $96,000 with equipment; electric lightning and air-marking installation, $30,000; repairs and improvements in buildings, $25,900. Appropriations are being arranged and bids will be asked soon.

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until June 28 for malleable iron, brass, aluminum and manganese bronze castings (Circular 151).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 18 for two steam-driven deck winches and spare parts (Schedule 5293); until June 21, spare parts for airplanes (Schedule 900-8480), for Eastern and Western navy yards.

WESTERN PA. DIST.

United States Engineer Office, Pittsburgh, asks bids until June 18 for one vertical triplex single acting plunger pump (Circular 400).

Commanding Officer, Naval Ordnance Plant, Charleston, W. Va., plans extensions and improvements in electric light and power systems at local yard, to cost $13,350, and for extensions and rebuilding of railroad lines, cost $18,800. Appropriations are being arranged.

Kanawha & Hocking Coal Co., Mammoth, W. Va., plans new river storage and distributing terminal at Harewood, W. Va., with conveying, loading and other equipment for capacity of 2500 tons a day.

Board of Trustees, Edinboro State Teachers' College, Edinboro, Pa., has plans by Meyers & Johnson, Commerce Building, Erie, Pa., architects, for new power house for central steam-heating service, in connection with other buildings, for which total appropriation of $600,000 is being secured. Power station will cost close to $180,000 of amount noted, with equipment.

MICHIGAN DISTRICT

Forging & Casting Corpn., Ferndale, Detroit, manufacturer of automobile parts, etc., has let general contract to Austin Co. for one-story addition. Cost about $25,000 with equipment.

Kelsey-Hayes Wheel Corpn., 3600 Military Avenue, Detroit, manufacturer of automobile wheels, has plans for one-story addition, 86 x 180 ft., primarily for storage and distribution. Cost over $45,000 with equipment. Giffels & Vallet, Inc., Marquette Building, is engineer.

National Body Corpn., 57 East Canfield Avenue, Detroit, has been organized by J. Peter Jensen, 9810 Wisconsin Avenue, and associates, to manufacture automobile bodies.

Delbert Fortney, Mount Pleasant, Mich., is at head of project to build a new gasoline refinery at Salzburg, Mich., where property is being acquired. It will consist of several units, with storage and distributing facilities. Cost about $300,000 with machinery. A company will be organized to carry out enterprise.

PACIFIC COAST

General Brewing Corpn., 261 Newhall Street, San Francisco, has let general contract to Cahill Brothers, 206 Sansome Street, for two-story addition. Cost over $40,000 with equipment. Fred H. Meyer, 525 Market Street, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 18 for one motor-driven metal band saw machine for San Diego Navy Yard (Schedule 5307); five fresh water pumps and spare parts for Puget Sound yard (Schedule 5291); one 150-hp. Diesel engine unit and spare parts (Schedule 5313), 2000 steel tubes for fuel oil heater service (Schedule 5309), propeller shafts (Schedule 5321); until June 21, steam-jacketed galley and kitchen kettles (Schedule 5271), and 3400 lb. admiralty metal condenser tubes (Schedule 5277), for Mare Island yard.

Seattle Brewing & Malting Co., 3100 Airport Way, Seattle, plans remodeling former Georgetown Brewery, near Seattle, and installation of new equipment. Cost over $90,000 with machinery. Joseph Wohleb, Chambers Block, Olympia, Wash., is architect.

Board of Education, Long Beach, Cal., has let general contract to W. Jay Burgin, 1100 Redondo Avenue, for one-story vocational training shop at John Dewey high school, 81 x 143 ft. Cost over $55,000 with equipment. Victor Siebert and Vern D. Hedden, 120 East Third Street, are architect and mechanical engineer respectively.

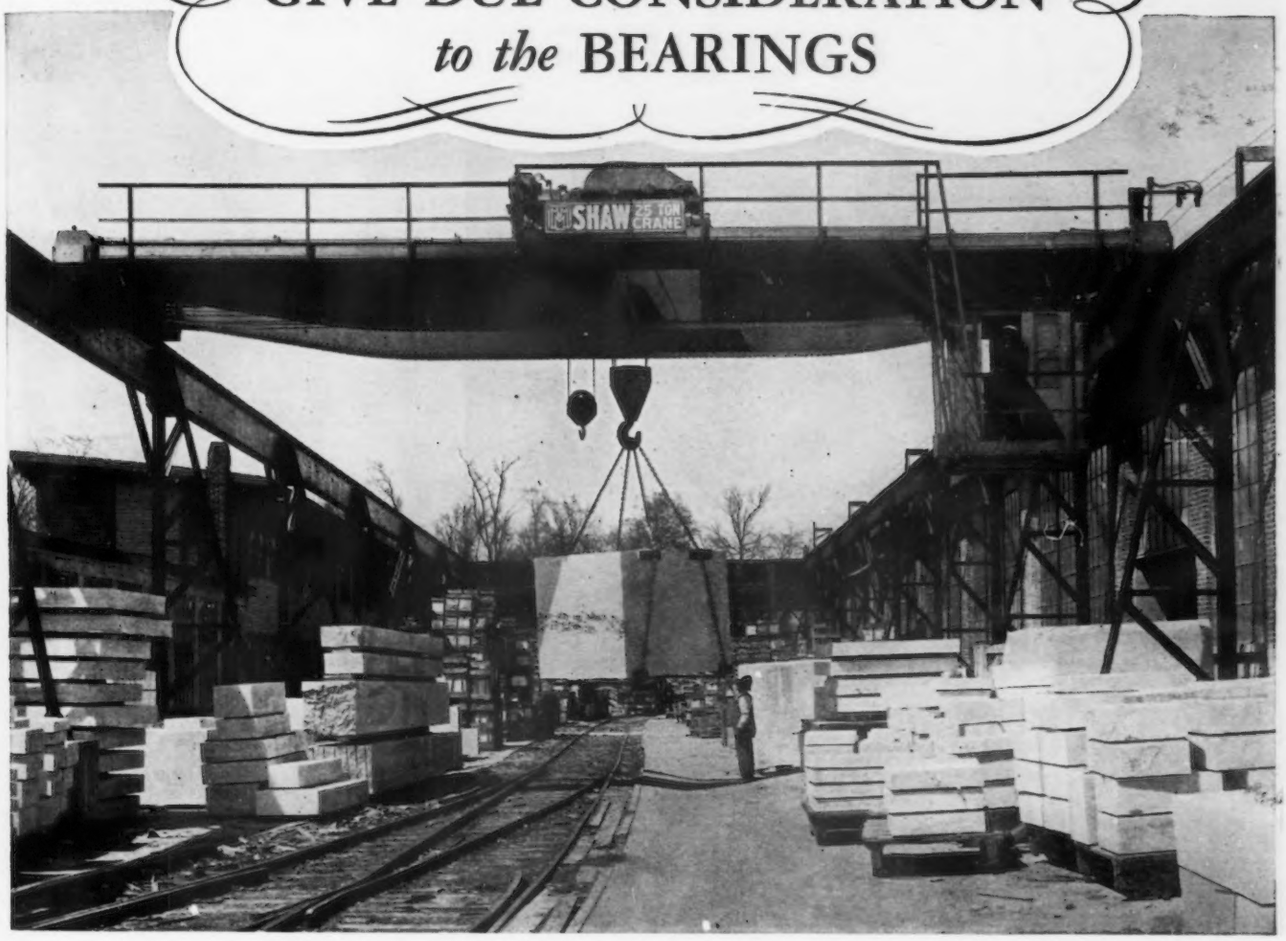
Board of Public Works, City Hall, Los Angeles, will receive bids until June 19 for new pumping plant for Terminal Island sewage treatment plant, San Pedro Harbor, including pumping machinery and accessory equipment, pipe lines for sludge and other service, etc.

Construction Service, Veterans' Administration, Washington, asks bids until June 25 for deep-well pumping machinery for institution at Los Angeles.

Heavy Vote in Employee Primary

PITTSBURGH, June 11.—Employees of the Carnegie Steel Co.'s plants in the Pittsburgh district today held primary elections for nominating representatives under the employee representative plan. Out of a total of 20,534 workers eligible to vote, 17,509 voted, representing 85.25 per cent of all eligible voters. Final elections will be held starting June 14. The Carnegie plants in the Youngstown district will hold primary elections later this week. The Jones & Laughlin Steel Corpn. will hold similar elections this week, as will other companies in the Pittsburgh and Youngstown districts.

GIVE DUE CONSIDERATION *to the* BEARINGS



Whether it's handling huge blocks of marble or tons of metal makes no difference to this Hyatt-equipped Shaw Crane built by SHAW-BOX CRANE & HOIST COMPANY.

Hyatt Roller Bearings go on serving and saving without attention except for an occasional lubrication. No matter how extreme the conditions or heavy the loads, operating amidst dust or dirt, indoors or out—Hyatts are protecting equipment everywhere.

They do their work so efficiently that many times when they are in a product, the user is scarcely aware of it. But the builder of Hyattized machinery knows why he put them there—he appreciates the importance of good bearings. So whether you build, buy or sell equipment, we repeat —give due consideration to the bearings. Hyatt Roller Bearing Company, Newark, Detroit, Chicago, Pittsburgh, Oakland.

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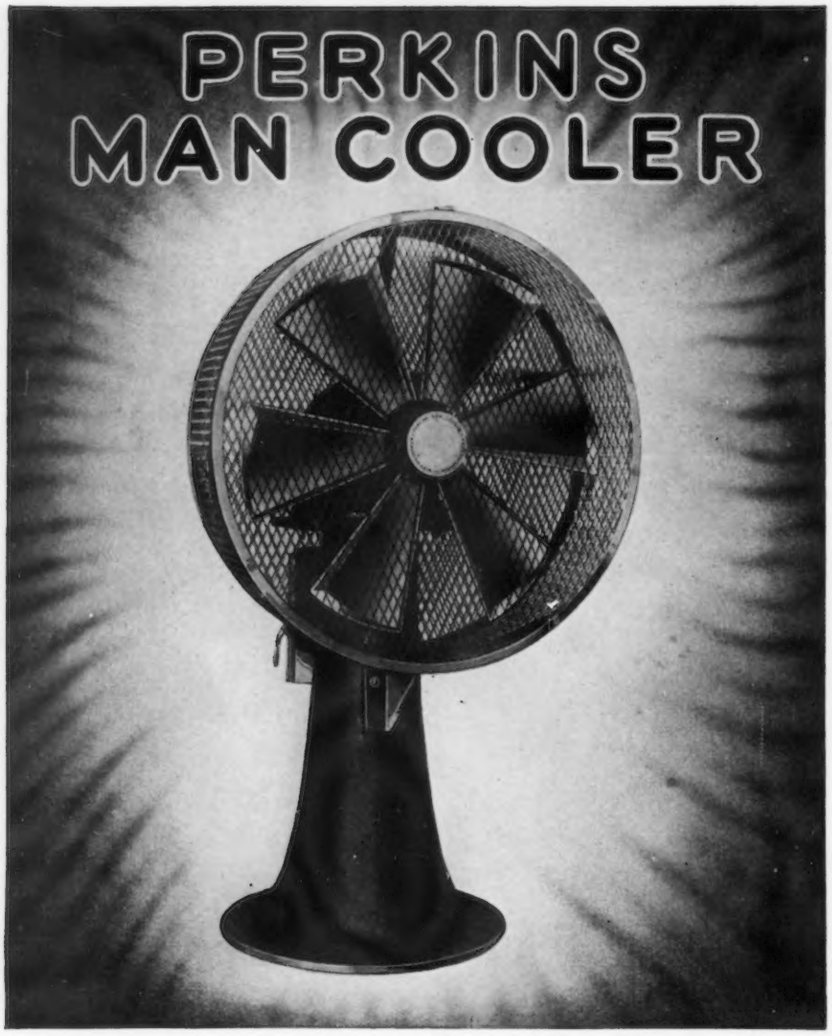
ROLLER BEARINGS
PRODUCT OF GENERAL MOTORS



Oscillating and Stationary Types—Hundreds of users of Perkins Man Coolers have proven for themselves the wisdom of investment in Perkins Man Coolers.

Readily moved from place to place, they bring comfort to men working in hot places, resulting in decreased labor turnover, increased production and fewer accidents.

B. F. PERKINS & SON, INC., Holyoke, Mass.
ENGINEERS AND MANUFACTURERS

Cost of Heat-Treating Bolts

(CONTINUED FROM PAGE 21)

the line of travel of the bolts from the threading department to the heat-treating department. Only one man is required for the complete washing operation. Estimated maximum capacity is 70,000 lb. of bolts in 8 hr.

Selection of the most efficient cleaning compound to be added to the hot water was important. In the manufacture of cold-made bolts the hot-rolled stock is first pickled, coated with lime, and drawn through wire-drawing dies which use a special wire-drawing lubricant. As a result, the unthreaded portion of the bolt has a waxy coating, a mixture of lime, oil, and wire-drawing lubricant, which is pressed into the surface of the steel. Manufacturers of cleaning compounds made recommendations for the proper agent to remove not only the oil and dirt, but also the tightly adhering coating of the original stock.

The product processed in this machine varies in size from 3/16 in. to 7/8 in. in diameter and up to 8 in. long. There is no marring of the threaded work due to the slight tumbling action in the rotating drum.

Some of the important features of the washing machine are:

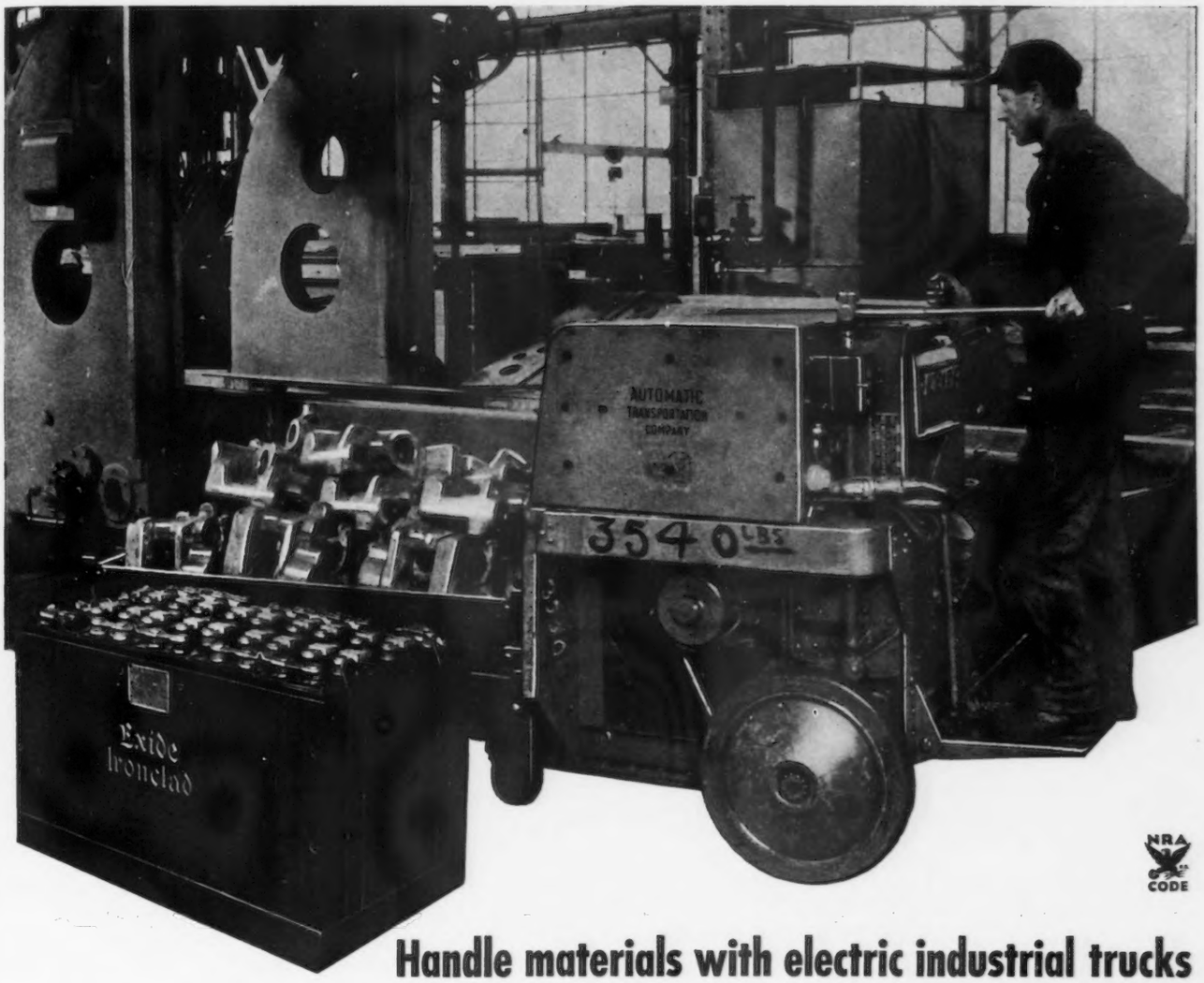
1. Push button controlled elevator and dumping mechanism. Automatic stop at top and bottom.
2. Rotating spiral-feed washing drum, with submerging effect in first portion and perforated draining in latter portion.
3. Automatic washing and conveying of empty tote box to the lowering arms at discharge end.
4. High-pressure pump and high-velocity non-clogging spray nozzles for bolts and tote box.
5. Construction of cleaning solution tank, with sludge clean-outs, strainer, scum overflow and drain.
6. Automatic temperature control with steam heating coils.
7. Ventilating fan to carry off excess water vapor.

The bolt washing machine was designed and built by N. Ransohoff, Inc., Cincinnati, the engineers of the Oliver company assisting in its design. Special requirements of space and manufacturing methods were prime factors in determination of the design.

Navy Calls For Bids

The Navy Department has issued schedules for bids on various classes of steel, the largest single lot being 900 tons of plates on which tenders will go in June 18. On the same day bids will be opened for 40 tons of sheets, and 195 tons of rivet rounds. Opening dates for other bids and requirements follow:

June 7: 363 tons of welding rods; 130,000 ft. of aircraft cables; 120,000 pieces of boiler tubes; June 11: 108 tons of sheets and 30 tons of stainless steel billets; June 14: 193 tons of sheets; June 21: 502 tons of sheets; June 25: 342 tons of shapes.



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You'll save money in handling materials by relying on the proved and *provable* economy of electric industrial trucks and tractors powered by Exide-Ironclad Batteries. Operating and maintenance costs are minimized. Your materials handling trucks can be kept in continuous operation, with no "time out" for repairs. You get quiet, efficient operation, smooth acceleration that prolongs truck life, almost unlimited power when needed, and maximum safety for your personnel and property with minimum fire hazard.

Both in performance and economy, Exide-Ironclad Batteries offer outstanding advantages. Their high power ability enables them to handle unusual loads on excessive grades. Their sustained voltage means good speeds throughout the day. They keep your materials handling service free from interruptions, providing continuity of service.

Exide-Ironclads give long, trouble-free service, and reduce maintenance to a minimum. At no increase in price, they are equipped with the new Exide Mipor Separator—the permanent storage battery plate insulator. Let Exide-Ironclads improve your materials handling service and cut costs. Write for bulletin, "The Adaptability of Electric Industrial Trucks and Tractors."

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BATTERIES
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"MIPOR," Reg. U. S. Pat. Off.

A New
WISSCO Design
CIRCANE

Circane was designed to meet the requirements of simple dignity, normal concealment and major free air space opening. It is a development of the age-old combination of the circle and cross peculiar to several ancient civilizations. It is particularly suitable for early American or Georgian period requirements. Made in Bronze, Brass, Aluminum and Cold Rolled Steel. This folder shows CIRCANE and other new WISSCO designs. Send for a copy.

WICKWIRE SPENCER STEEL COMPANY, 37 East 42nd St., New York City
Worcester Buffalo Chicago San Francisco

WICKWIRE SPENCER
perforated metals

Zinc Ammonium Chloride in Modern Galvanizing

(CONTINUED FROM PAGE 27)

country. All of these attempts have followed more or less closely the three methods in which zinc ammonium chloride can be used as a flux in sheet galvanizing. These three methods are as shown in Table VII.

Inasmuch as a liquid flux in various degrees of strength has been tried in the attempts made to use zinc ammonium chloride, the methods just mentioned show the high and low of the various strengths used in the experiments.

Aside from extra floor space, equipment and handling required where preheating of the fluxed sheets is a part of the process, all of the above methods present a fundamental obstacle in that the liquid fluxing solution, regardless of strength, will not remove any heavy oxide which may form on the sheets between the sheet storage tank and the "bosh" or liquid flux tank. Due to the period of time during which oxidation may set in, this is especially applicable where the sheets are not put into a "bosh" tank, but are placed on a table and fed from there, one by one, into the liquid flux, through it, and on into the galvanizing pot.

A constant source of expense is the steady dilution of the liquid flux from water clinging to lifts of sheets brought from the sheet storage tank for fluxing and subsequent galvanizing.

Although experimented with, method No. 1 produces so many objectionable features as to quickly label it impractical. The sheet, while apparently dry from the heat of the fluxing solution, still holds sufficient moisture on its surface to make its entrance into the molten zinc one of menace to the galvanizing personnel. The sudden change of temperature which the sheet undergoes when immersed into the molten zinc tends to induce buckling or "cobbling" of sheets, and this tendency is increased by the lack of support and preheating which a volatilizing flux of normal depth in the flux box gives to a sheet. Unless the oxide which forms on the surface of molten zinc is skimmed off or aside immediately prior to the immersion of each sheet into the zinc, it will cling to the sheet and show up on the galvanized product.

The sheets, while lying in the zinc ammonium chloride solution, coat unevenly, some sheets having spots of "heavy flux" which will not completely melt or volatilize while the sheet is going through the pot and which show up as flux spots on the galvanized product.

Method No. 2 as shown in Table VII presents the same obstacles to successful operation as does method No. 1, except that the use of a preheating oven eliminates the personal hazard of splattering zinc and also greatly reduces the buckling or "cobbling" tendencies of thin gage sheets.

While method No. 3 represents the practice with zinc ammonium chloride that has offered the most promise and received the most attention from sheet galvanizers, it still has not shown sufficient merit to warrant its substitution in place of hydrochloric acid and sal ammoniac.

The amount of zinc ammonium chloride consumed in the initial "making up" of a liquid and volatilizing flux for sheet galvanizing and in keeping these two fluxes serviceable, is such as to make the overall cost of fluxing with this product higher than it is with hydrochloric acid and sal ammoniac.

Because sal ammoniac has a speedier fluxing action, a more intense "bite," the rate of production through the galvanizing pot when using this product in the flux box cannot be equalled with zinc ammonium chloride, and attempts to do so result in "no coating" spots or an excessively high flux consumption.

On account of its shorter serviceable life, its faster rate of decomposition, the percentage of black or "sal" spots on the galvanized sheets is higher with zinc ammonium chloride, while the appearance of the sheets as a whole and the clearness of the galvanized spangles are materially affected by its less intense attack or cleaning action.

Editor's Note: In a forthcoming issue the author will conclude his review of the applications of zinc ammonium chloride in the galvanizing of various types of products, such as plates, hardware, pipe, etc.